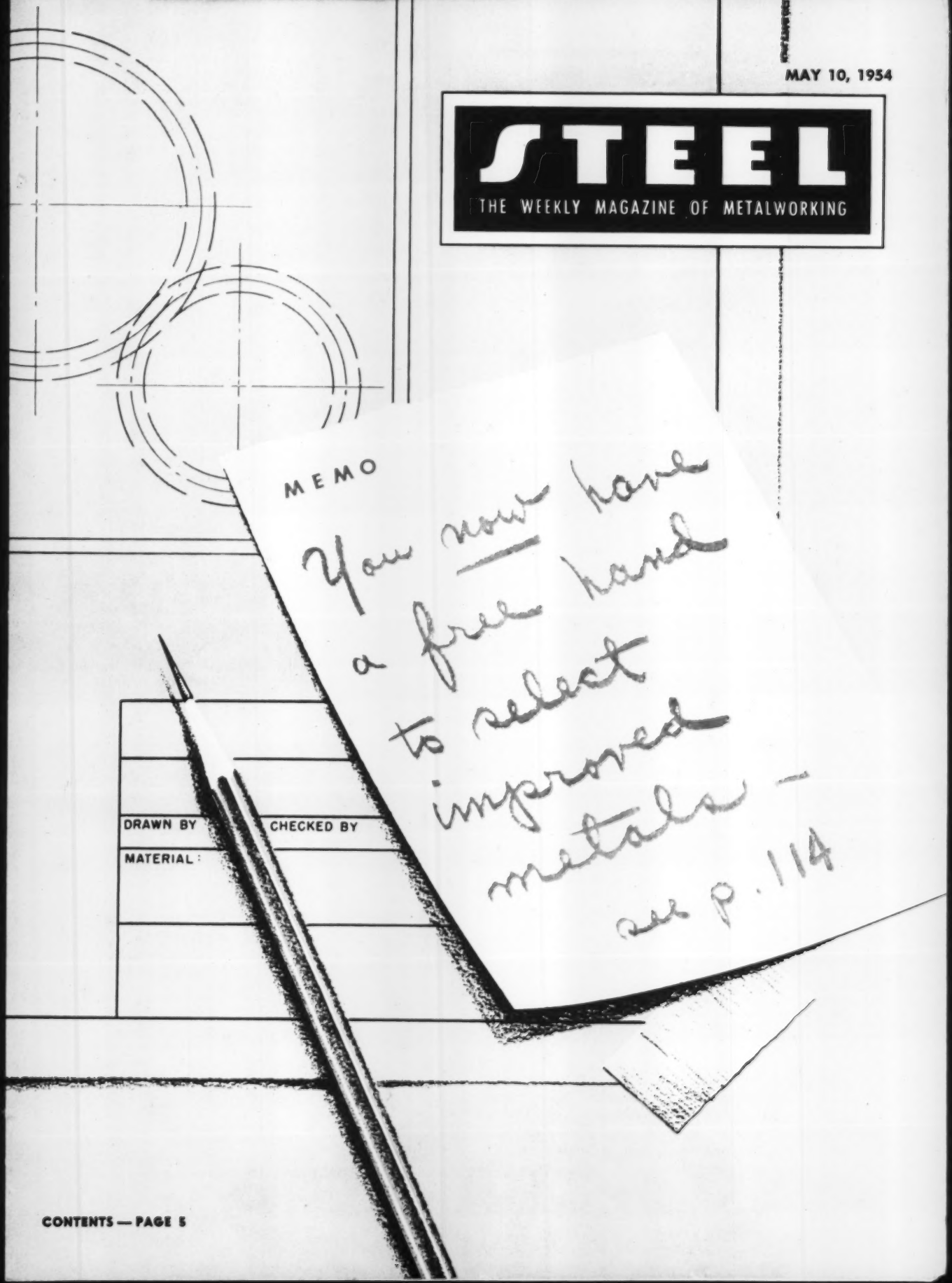
MAY 10, 1954

STEEL

THE WEEKLY MAGAZINE OF METALWORKING



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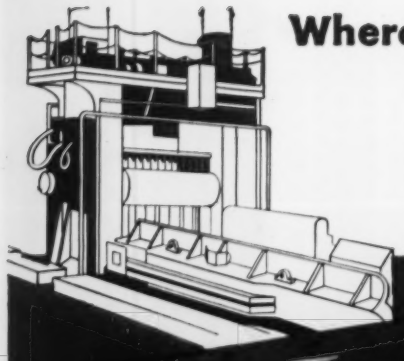


Where Severe Duty IS NORMAL DUTY

HANDLES REPEATED OVERLOADS WITH EASE

Extra overload capacity . . . extra durability and reliability have been built into this heavy duty contactor — to make your roughest dc drive a smooth running, precision operation . . . to assure maximum production and quality with a minimum of outage time and maintenance. Principal component on the Allis-Chalmers constant potential panel, the Type 260 dc contactor is a rugged unit engineered to withstand punishing current surges inherent in steel mill auxiliary drive operation.

Here's Why!

● **Quick quenching minimizes contact burning** — Arc centering blowout uses thermal convection and magnetic action to stretch, cool and extinguish arc. Rapid circuit interruption minimizes burning and pitting of contacts.

● **All current-carrying parts silver to silver** — Main contacts are high density forged copper, plated with silver for dependability and extended life. Auxiliary contacts are solid silver . . . need no dressing.

● **Magnet coil designed for continuous duty at 110% of rating** — Coil layer wound with insulation between layers . . . vacuum impregnated to resist moisture and abuse. Operates contactor at less than 80% of rated voltage when hot. Holds at 20% of normal voltage.

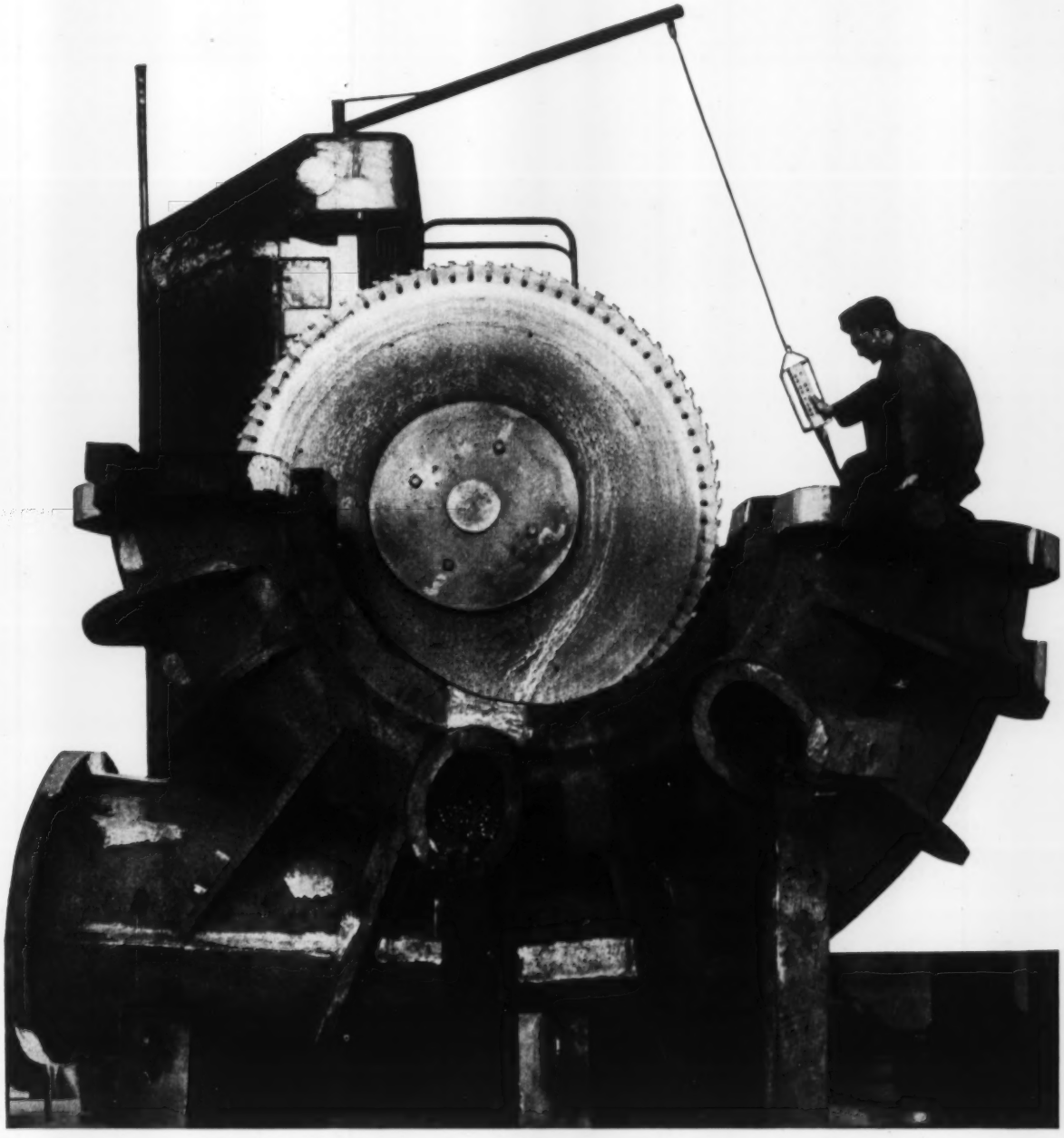
● **Other features.** Rolling contact action. Arc handled on tips, current on clean heels . . . no destructive scuffing. Design simplicity eliminates troublesome linkages, arms and pivots. Lifetime *Oilite* shaft bearings need no lubrication. A-4326

SIMPLIFIED ROUTINE INSPECTION

Keeping the Type 260 contactor in top operating condition is merely a matter of preventive maintenance through routine inspection. All components are readily accessible. Arc chute lifts off to expose contacts which may be removed by loosening one bolt. Auxiliary contacts are mounted on contactor frame in full view. Operating coil is held by a single bolt.

For complete information, call your nearby Allis-Chalmers representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS



Carving a 5-in. Slot in a 40-Ton Casting

This one-piece steel casting is the upper portion of a huge blower to be used in an aircraft-testing wind tunnel. It is a big casting by anybody's standards, and one that was not simple to make.

The part weighed slightly under 40 tons as cast. Specifications called for a slot 5 in. wide through 17 in. of solid steel. That's what's going on in the picture — the slotting operation. Bethlehem made the incision with a 9-ft rotary saw, which would qualify as major machining anywhere.

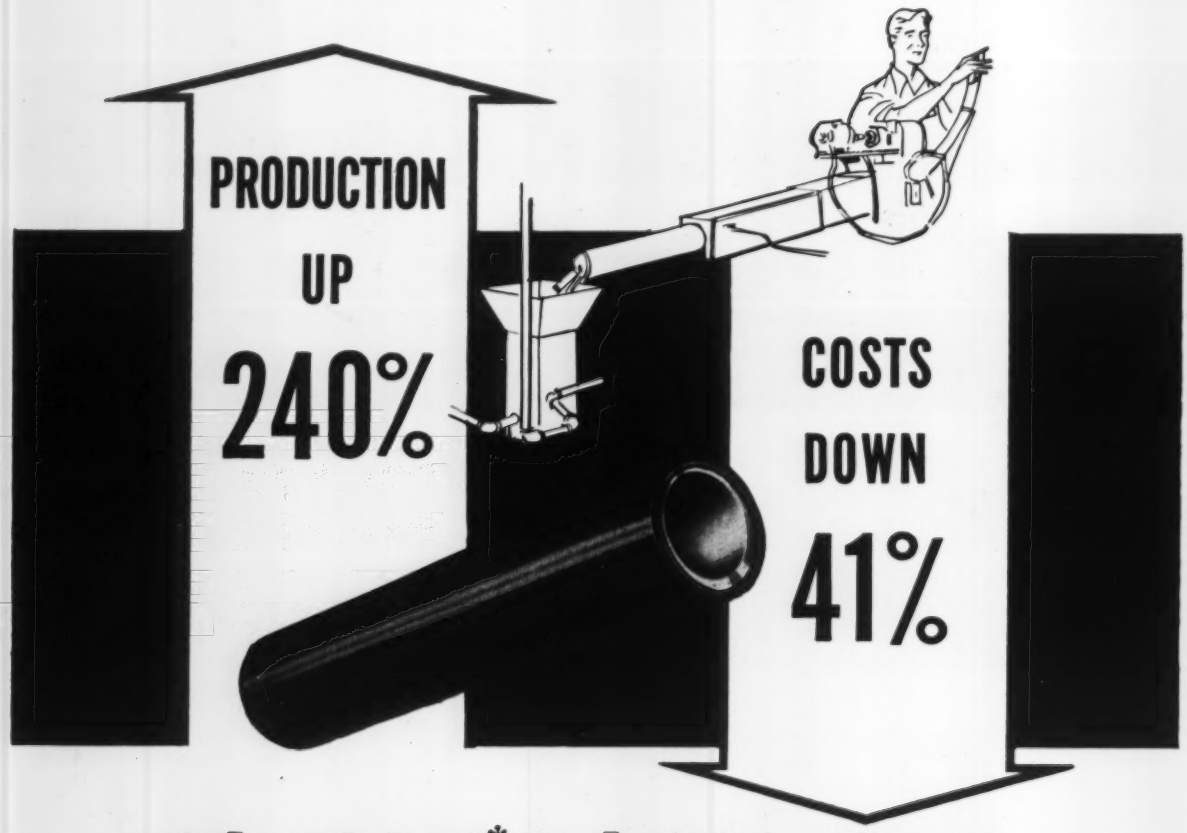
If your own work requires iron, steel, or bronze castings, be sure to investigate the many unusual services we offer. A Bethlehem-made casting is subject to precise metallurgical controls and careful attention to engineering details. It can be given any desired type of heat-treating. And if machining is needed, our shops can handle the job beautifully.

Not all Bethlehem castings are as large as the one shown here. Naturally, we're interested in the smaller kinds of work, too. But large or small, a Bethlehem casting is a *good* casting — as good as you can buy. Why not send us your next inquiry?

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL



with TOCCO* Induction Heating

Whether you're interested in upping production or downing costs—or both—it pays to investigate TOCCO Induction Heating if you heat-treat, anneal, braze, solder, forge or melt ferrous or non-ferrous metal parts.

PRODUCTION UP—When Thompson Products Ltd., St. Catharines, Ontario switched from conventional methods to TOCCO Induction Hardening of their automotive wrist pins, production rose from 500 to 1200 per hour.

COSTS DOWN—While production jumped, costs fell from $5.46 per hundred parts to $3.23—a savings of more than 2c per pin or $26.76 per hour on the hardening operation alone.

OTHER ADVANTAGES— Additional savings result from elimination of hauling wrist pins to and from the heat-treat department. Cool, clean TOCCO fits right in the production line, next to related operations—takes only ¼ the space of the pusher-type furnace previously used.

In Canada or the United States TOCCO engineers are glad to survey your operations for similar cost-cutting results—no obligation, of course.

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NEW FREE BULLETIN

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Dept. S-5, Cleveland 1, Ohio

Please send copy of "Typical Results of TOCCO Induction Hardening and Heat Treating".

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Position_____

Company_____

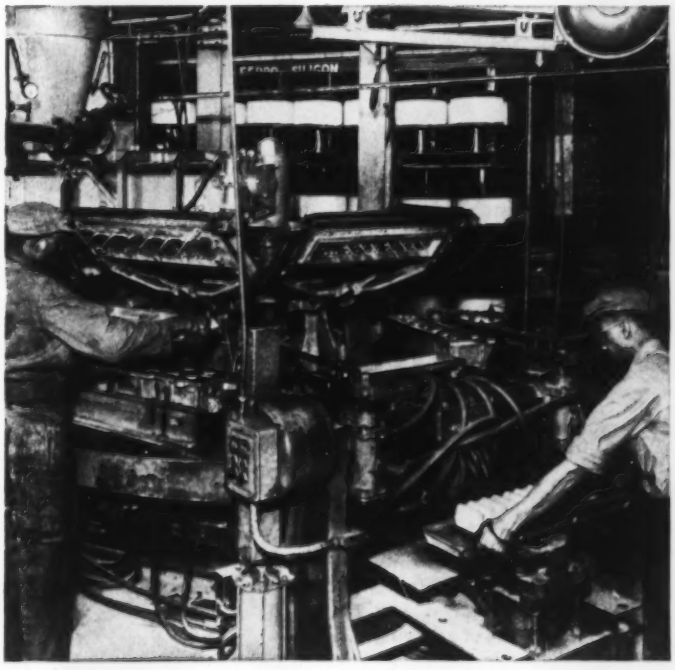
Address_____

City_____ Zone____ State_____

Up to 5 different cores at one time—on long-run or short-run production

OSBORN ROTO-CORE AUTOMATIC

produces more than 2500 cores daily



CORES NOW COST LESS...

Two men and one machine often produce more than 360 blown core boxes an hour *automatically.*

Push Button Production. See what can be done to lower your core production costs with Osborn's push-button methods.

Completely automatic, the Roto-Core turns out top-quality cores at a constant, uniform rate throughout the day... gives you core production at minimum cost.

With the Roto-Core, your production facilities become versatile because:

If production requirements are moderate or low, change-over can be made in minutes. As many as 5 different core boxes can be blown at the same time combining short-run or long-run production on the same machine.

If production lots are high, 5 duplicate core boxes can be blown at the same time.

It will pay you to investigate. An **interesting film** has just been completed. Now available to interested groups. Call or write The Osborn Manufacturing Company, Dept. EE-18, 5401 Hamilton Avenue, Cleveland 14, Ohio.

Another example of Osborn leadership and advanced engineering

OSBORN

MOLDING MACHINES CORE BLOWERS

IT'S NEW...IT'S NEWS!

...this 360° Bearing Counter

Smaller and more compact than ever, this new 360° Bearing Counter gives users several *bonus* advantages: It can be either base-mounted, or face-mounted flush with a panel surface. It will run at 1500 rpm constant speed or 2500 rpm on intermittent service . . . and it comes equipped with Geneva Transfer.

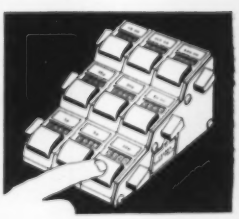
Added Evidence that —

Everyone Can Count on VEEDER-ROOT

This is another Veeder-Root "first" . . . the latest of one of hundreds of standard and special Veeder-Root Counters for every mechanical and electrical application. What do *you* want to count? Write:

ANOTHER NEW VEEDER-ROOT "FIRST"

New *Vary-Tally* Multiple-Unit Reset Counter gives you quick finger-tip count of anything countable. Comes in any combination up to 6 banks high, and 12 units wide (minimum of 2 units wide). Write for news sheet and prices.



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Offices and Agents in Principal Cities

"The Name that Counts"

This Week in Metalworking

STEEL
THE WEEKLY MAGAZINE OF METALWORKING

Vol. 134 No. 19 May 10, 1954

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Luster-on passivating dip added to *zinc* costs less than cadmium, copper-nickel-chrome or any other finish available today.

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Type LT-840
Low temperature Xactemp Pyrometer with rigid extension arm and surface tip thermocouple.

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This is the answer to quick, accurate temperature readings below 800° F. in many industrial processes and operations. And it's so convenient to handle.

The Xactemp hand-type pyrometer, Model LT-840, is used with needle thermocouples, ribbon thermocouple, surface tip thermocouple, and other specially designed thermocouples and extension arms. These are easily interchangeable and, without adjustments or recalibration of the instrument, quickly ready it for measuring the surface temperature of stationary and revolving rolls and cylinders, flat and irregular surfaces of molds, dies, etc. in rubber and paper making, plastic materials, rubber, wax, oils, greases, and other semifluid materials.

Handy, compact design makes this Xactemp pyrometer ideal for field service, laboratory, and production-line use.

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behind the scenes

More About Selling

We've been reading again. This time it's a very interesting little book called *The Old Country Store*. A fellow named Gerald Carson wrote it.

The excerpt we want to tell you about is the one in which Mr. Carson relates how the Scovill Mfg. Co., Waterbury, Conn., gave birth to the modern industrial salesman back in 1832. Up to that time, peddlers and drummers piled their wildly-painted wagons with a hodge-podge assortment of products and took off across the countryside in will-o'-the-wisp fashion.

Scovill decided on a bold experiment in selling practices and in 1832 sent out a button salesman by the name of Merit Welton. He was assigned a specific territory—the middle west. Welden was not a peddler. He had the distinguishing characteristics of the modern commercial traveler; he did promotion work, carried no stock, sold from sample cards, took orders according to sample, accepted no barter goods, and the company made delivery later by freight.

The results of this "big idea" were disappointing. Mr. Carson points out, however, that Welton hung pictures of the Scovill factory in the public rooms of hotels across the middle west. He gave a grand set of brass buttons to the head of the Cincinnati Fire department, collected useful information about the credit ratings of customers, and learned more than had been known ever before about the kinds of buttons the public wanted. Today, these are common selling practices.

Well, 1832 or 1954—take your choice. The need for bold experimentation in selling and distribution is as great today as it was then.

Satchel Says

The "ageless" Satchel Paige, major league pitching star whose age has been estimated at every figure from 30 to 55, is reported to have given this advice on how to avoid growing old: "Keep running," says Satchel, "and never look back. Who knows, something might be gaining on you."

That's as good advice as we can think of on how not to grow old age-wise, business-wise or just "anywise." We bring it up merely because we know that the hot, humid breath of competition is blowing on many a business neck these days, and the editors of STEEL are continually planning new ways to supply you information that will help keep you running at the head of the pack.

Here are a few of the forthcoming features which you will be very interested in reading:

. . . The Program for Management installments for the remainder of 1954 include: Regularizing Production, Employment; Distribution—Integration Needed; Distribution—Training Personnel; Distribution—Transportation; Product Diversification; Foremen—Bridge to More Efficiency; Product Design. These will run monthly, May through December.

. . . On July 12, STEEL will publish the second edition of its "Guide for Steel Buyers." It will be even more complete and useful than the 1951 edition.

. . . A total of 12 installments in the Modern Heat Treating series will appear in STEEL during 1954. This series is designed to help you realize the full cost-cutting potential from the proper application of heat treating.

Webster Had a Word for It

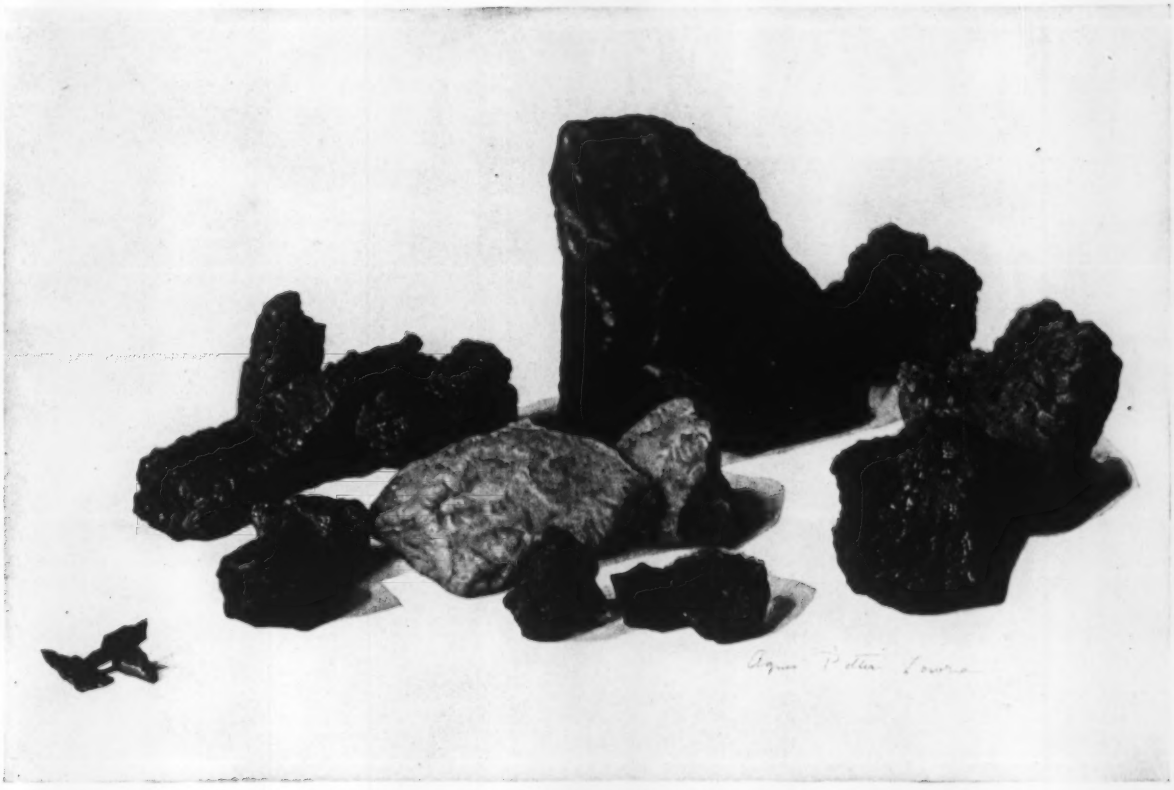
Incidently, word has it that Webster's kind of English is passe. If you want to understand in management circles these days you've got to use this new universal language.

You no longer make arrangements for a meeting: now you tool-up. You no longer attend a conference: you make a formation. The unendowed talk about the production job they nixed: those in-the-know refer to it as a 16-pound gobbler; that is to say, it went over like a zinc zepplin. You no longer keep your nose to the grindstone; you now keep your head down and drive for the pin. And, as for getting the boss' approval, one sees whether the Pearless Leader sails for it.

These translations are with the courtesy of Gordon Bowman, Baker Raulang, Cleveland, Ohio.

Shrdlu

(Metalworking Outlook—Page 63)



"Fuel for the Furnaces" by Agnes Potter Lowrie, famed artist daughter of a noted steelmaker. In this first of a specially commissioned fine arts series, Mrs. Lowrie finds beauty in weathered iron ore, creamy limestone, shaggy coke — basic elements so common most steelmen take them for granted. Limited edition of 15 x 18 color prints available. Complimentary copy sent upon request.

The Fine Art of Steel Making #1

For 60 years the history of American industry has been the story of steel. You know the landmarks. The old, slow hand mill. Table trains with their lusty offspring, the continuous strip mill. And more recently, the speedy, almost automatic four-high mill.

During these 60 years every forward step in steel production has been paralleled by an equal advance in Ironsides Gear Shield lubricants. Heavy duty Gear Shield, once hand-paddled onto exposed gears, is now formulated with a solvent for quick spray application.

With increased use of encased gears, Gear Shield was produced in liquid form for pouring, pumping or timed-jet application. As pressure on production increased, Ironsides was among the leaders in developing extreme pressure lubricants.

Today, so widespread is the acceptance of Ironsides lubricants that other makers often refer to their own products as "gear shields", even though Gear Shield is an Ironsides trade mark.

Ironsides is not mass production. We are the "custom tailors" of lubrication. Our special position is due in large part to our flexibility. We can—and do—formulate for individual applications and supply these formulas in any quantity from pails to tank cars.

We like tough problems, and we've solved a lot of them. For example, Palmoshield, replacement for palm oil and most important advance in lubrication since World War II.

If you have a special problem, we'd like to help you lick it. A letter or phone call will summon one of our research engineers. Address The Ironsides Company, Columbus 16, Ohio.

SHIELD PRODUCTS

Ironsides

By the makers of Palmoshield • "the palm tree that grows in Ohio"

NIAGARA Inclinable Presses

Niagara Inclinable Presses with Air Sleeve Clutch cannot be matched for economy, efficiency and dependability on jobs requiring high frequency clutch engagement.

Write for information.

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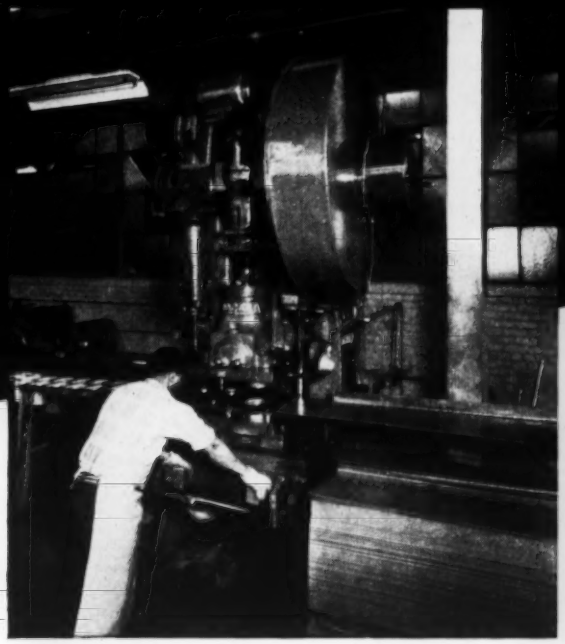
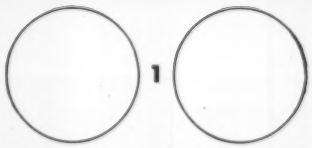
On the Production Line

AT SHWAYDER BROTHERS, INC., DETROIT



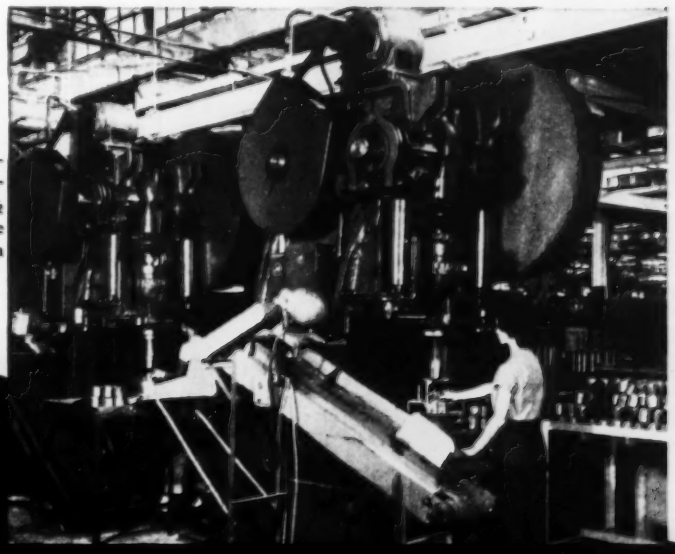


1. Punching two round blanks per stroke on Niagara A-5½ Press with Air Sleeve Clutch.

2, 3. Cupping and Redrawing on A-5½ Presses with Air Sleeve Clutches.

4, 5, 6, 7. Indenting end on A-3½ Presses.

8, 9. Forming hexagonal shape and Ironing side wall on A-5½ Presses with Air Sleeve Clutches and with Niagara Cushions.



The final piercing and tapering operations are done on A-3½ Presses (not shown.)

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America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

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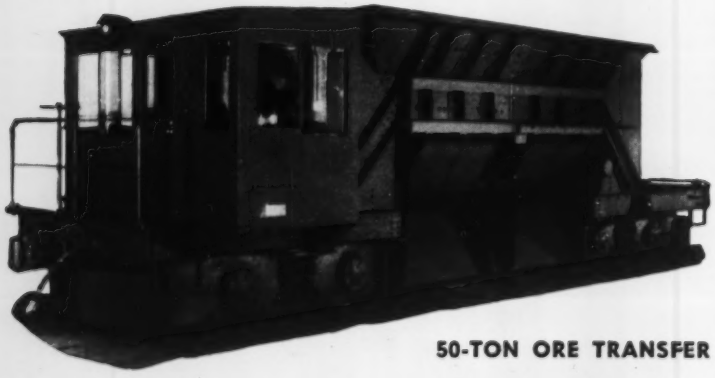
It's Atlas Transfers for dependable, year-in, year-out service . . . for operator safety and convenience which approaches semi-automatic service.



50-TON ORE TRANSFER

This Atlas Ore Transfer is equipped with modern hydraulically-operated discharge gates and brakes. Steel plate trucks are provided. The cab is overhung at one side to give the operator a line of vision alongside the car. The car is equipped with electrically heated hoppers.

THE ATLAS CAR & MFG. CO.

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1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

LETTERS
TO THE EDITORS

Looking Forward to New Guide

We believe your idea of compiling and publishing STEEL's Guide for Steel Buyers is excellent and appreciate the opportunity of being included.

Howard C. Williams
general sales manager
Continental Steel Corp.
Kokomo, Ind.

We appreciate the opportunity to have our products incorporated in your steel buyers' guide.

Robert F. Bourne
general sales manager
Wickwire Spencer Steel Division
Colorado Fuel & Iron Corp.
Wilmington, Del.

Thank you for including us in your survey. The guide should prove valuable to steel buyers, and we wish you a minimum of headaches in assembling it.

Thomas S. Blair
president-sales manager
Blair Strip Steel Co.
New Castle, Pa.

We appreciate very much the opportunity to be included in STEEL's Guide for Steel Buyers.

K. L. Kinser
sales representative
Copperweld Steel Co.
Warren, O.

We appreciate very much the opportunity of being listed in this guide which we know will be of great interest to industry.

Paul H. Carlson
Tubular Products Division
Babcock & Wilcox Co.
Beaver Falls, Pa.

• STEEL's *Guide for Steel Buyers—including carbon, alloy, low alloy-high strength and electrical steel products—will be published as a supplement to the regular issue of July 12. All regular subscribers will get a copy of the guide with their subscriptions.—ED.*

Progress in Steelmaking

I am interested in your article "Rare Earths Moving Fast" (Mar. 15, p. 104). I would like to obtain additional information on this relatively new development and would appreciate suggestions as to possible sources.

Edward J. Planz
Aircraft Division
Kaiser Metal Products Inc.
Bristol, Pa.

• *That information may be obtained from Molybdenum Corp. of America, Pittsburgh, or from the authors of the article, William E. Knapp and Wilbur T. Bolkcom, American Metallurgical Products Co., Pittsburgh.—ED.*

Another Hit in Series

I have just finished reading your article "Automation: How Far Should You Go?" (Apr. 12, p. 87), No. 3 in the 1954 Program for Management series.

This is an exceptional and worthwhile

(Please turn to page 12)

Angier VPI Wrap stops rust!

Protects $242 gear kit for only 9¢

Maybe you know that vapor-from-paper stops rust! That's how these gears stay bright and corrosion-free without messy slushing oils or grease.

But would you guess that the gears—worth about $242 a box—are protected for less than 9¢?

That's the cost of that sheet of Angier VPI Wrap* you see above. Yet, it is the one preservation method that is so simple to use that it saves untold hours of packaging time and labor. It is so effective that even exporters ship VPI-protected products throughout the world, confident that valuable machinery and parts will arrive bright and free from rust.

What is your preservation problem? Angier, the most experienced name in vapor rust preventives, may be able to help. You'll get unmatched service from our experienced engineers and from the Angier franchised distributor near you. Send for facts on Angier VPI Wrap and free sample.

*® Vapor rust preventive. Angier VPI Wrap (2 gram) is made to conform to the government's specification on volatile rust inhibitors—MIL P 3420.

At 9¢, you can't afford less than the best!

Angier

VPI CUTS LABOR 50%. The wrist pins above are now packaged in half the time without oil or grease coating . . . just wrapped with Angier VPI.

Angier's serviceman says, "By eliminating the need for dip and drain pans, Waukesha Motors made room for a more efficient packaging operation. And with this clean method this Wisconsin firm was able to adopt the new, attractive boxes you see in this photo."

Why don't you save the cost and bother of slushing the products you ship or store? You gain a sales advantage because you save customers the job of degreasing.

Send now for facts on Angier VPI Wrap—the original vapor corrosion inhibitor.

FREE VPI sample for your tool box...

Angier Corporation, Framingham 8, Mass.

Protective papers for industrial, building, farm needs since 1895

Send sample & *VPI FACTS* as applied to

- ☐ Machinery-Industrial, Metal Working, Farm, Office, Construction.
- ☐ Steel in process of fabrication.
- ☐ Electrical Machinery, Appliances, Products.
- ☐ Instruments and clocks.
- ☐ Fabricated Products—Cutlery, Hardware, etc.
- ☐ Ordnance Equipment.
- ☐ Transportation Equipment—Aircraft, Auto, Naval, Railroad, etc.
- ☐ Others:

Name, Title (Sign and clip to letterhead)

BUYERS OF STAINLESS PLATE have always found Carlson Weekly Stock Lists important. These lists tell them what they want to know about the *size, gauge* and *type* of stainless plate *in stock* at G. O. Carlson, Inc. Some time ago publication of these valuable lists had to be stopped . . . *but now they are again available!*

Carlson Weekly Stock Lists enable users to see what is available for immediate needs. They can order Stainless Steel Plate produced to chemical industry standards of excellence right "from stock", pattern cut if desired. G. O. Carlson, Inc. provides this time-saving service to the ever-increasing number of Stainless plate users . . . and prompt delivery is more than a promise, it's a fact!

We will be glad to send you these weekly Stock Lists as a reminder of what's available at G. O. Carlson, Inc. A note from you will "do the trick".

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District Sales Offices in Principal Cities

LETTERS

(Concluded from page 10)

series. I understand you had a 1953 Program for Management series also. Unfortunately STEEL was not channeled to me at that time and I did not have the benefit of reading it.

Would it be possible to receive tear sheets or reprints of the 1953 management series? I so thoroughly enjoyed the automation article that I am sure there would be a lot of meat in those articles I missed.

J. E. Puckett
assistant purchasing agent
McQuay-Norris Mfg. Co.
St. Louis

Would it be possible to get 10 reprints of your wonderful article on automation?

Robert F. Walk
Harrison Radiator Division
General Motors Corp.
Buffalo

Please send us 10 copies . . .

Jack R. Davis
Continental Tooling Service Inc.
Dayton, O.

• *Being sent.—ED.*

More on Management Series

We would like to receive 25 copies of "Now You Have To Sell" (Feb. 22, p. 91), No. 1 in the 1954 Program for Management series.

W. O. Touhey
purchasing agent
Kennametal Inc.
Latrobe, Pa.

. . . my reaction was that I definitely want a copy of "Now You Have To Sell" for my files.

H. W. Grikscheit
vice president
Nankervis Co.
Detroit

We would like 25 copies for distribution to our agents and sales forces . . .

J. Warren Behrens, chief analyst
Watson-Stillman Co.
Roselle, N. J.

I have been able to obtain copies of some of STEEL's 1954 Program for Management series. They were of current interest, concise, and well presented. I found them an invaluable aid and reference source in my studies, as well as in certain aspects of my present position. I would appreciate back copies of the 1953 Program for Management, if available.

Barry D. Deamond
Reeves Instrument Corp.
New York

Best Time Is Now

Your articles on the pros and cons of leasing and renting which ran as a series of three stories (Mar. 29, Apr. 5, Apr. 12) could not have come at a more opportune time. We would appreciate 12 or more tear sheets or reprints of this series of articles. The arguments therein would be of value to us and to our representatives.

B. VerNooy
T. D. Williamson Inc.
Tulsa, Okla.

• *This series is being reprinted under a single cover and will be distributed to fill requests as soon as available.—ED.*

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BRIGGS & STRATTON CORPORATION

1,000,000 INDUSTRIAL ENGINES

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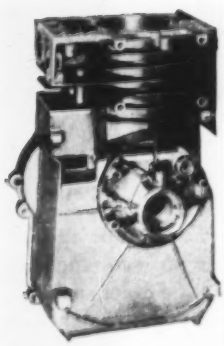

The intricate die-cast aluminum cylinder shown at the left is one of many produced at the B & S plant from high grade aluminum alloy melted in low-frequency AJAX induction furnaces. In these furnaces *only the metal is heated.* Energy is transmitted to the molten charge without actual contact through the refractory walls. There are no resistors or other parts having a higher temperature than is absolutely necessary for properly melting the charge. Overheating is avoided, and there is practically no oxidation.

The holding furnaces next to the die-casting machines as well as the melting furnaces are automatically controlled at a temperature within ±5°F., holding the metal at the lowest feasible casting temperature. The agitation due to internal electrical stirring in the metal gives the best conditions for holding furnaces, and there is little possibility of sludge formation at the bottom, because this is where the heat is generated.

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AJAX ENGINEERING CORP., TRENTON 7, N. J.

AJAX TAMA-WYATT

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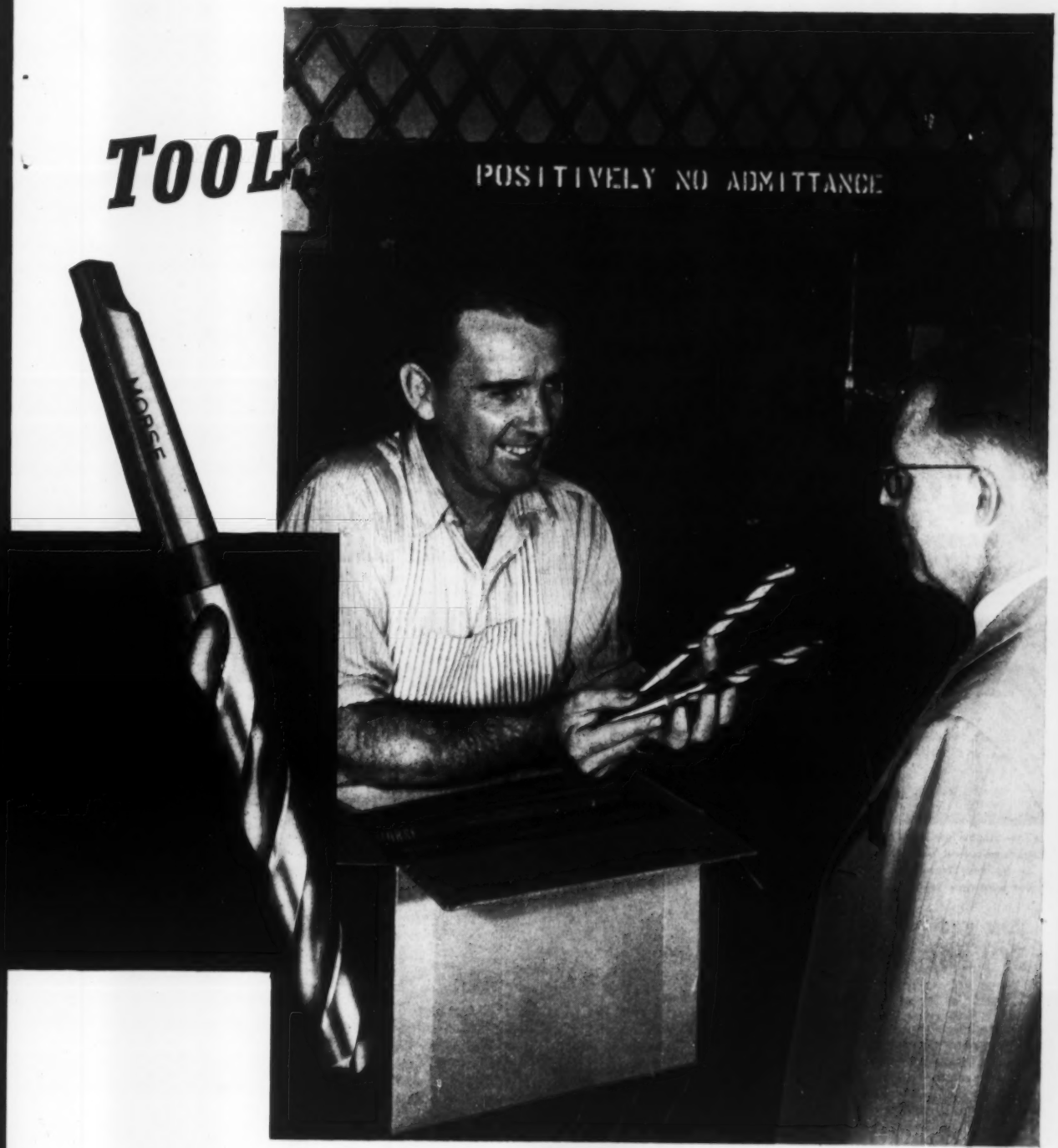

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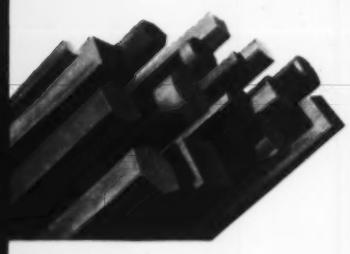
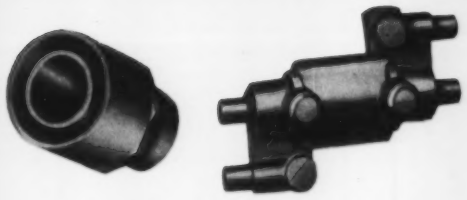
Brass and Bronze Free-Cutting Rods



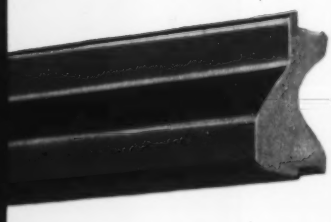
Furnished in all sizes from 1/16" for small-diameter rods up to 10" for cast and turned rounds. The most easily-machined of all metals and alloys.

Brass and Bronze Forgings



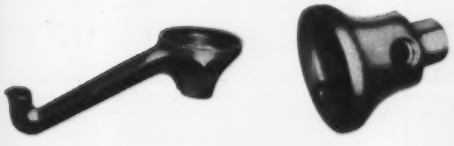
From 1/4 oz. to 100 lbs. in weight. Produced to meet requirements of uniform dimensions, finish and physical properties.

Extruded Brass Shapes



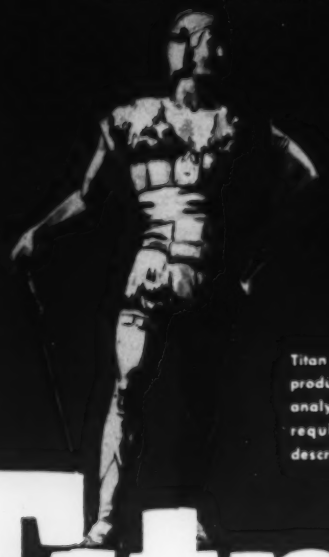
Squares, hexagons, half rounds, half ovals, and special shapes. Extruded-only rectangles furnished up to 5½" maximum diagonal. Extruded, drawn, machine-straightened hexagons up to 4", rectangles up to 3½" maximum diagonal.

Brass Pressure Die Castings



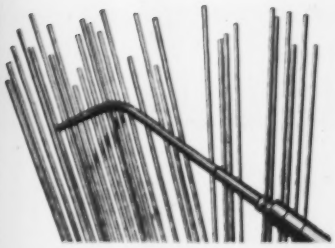
Parts having thin sections and intricate cored parts readily produced. Titan die castings have better finish, stronger structure and greater accuracy than sand castings.

Titan Brass and Bronze Products



Titan brass and bronze products are supplied in analyses to meet every requirement. Write for descriptive catalogs.

Bronze Welding Rods



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Brass wire for manufacture of rivets, bolts, screws, fasteners, etc.

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METAL MANUFACTURING COMPANY

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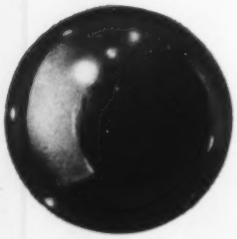
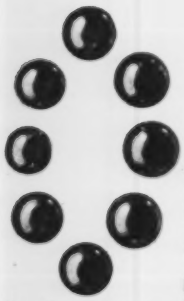
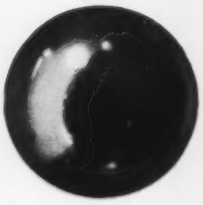
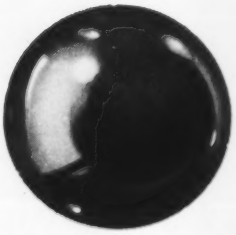


AND YOU'VE MODERNIZED!





The age of the Big Change is here: the propeller is giving way to the jet... precision is giving way to super-precision... the instrument quality controls of yesterday are industrial museum pieces today... motion itself has taken a new name: *speed.*



The America that rolled along on Federal decades ago is a new America, rolling on a new Federal today. The Federal bearing that once smoothed the way for one horsepower has been modernized to do the same job with a 1/10 horsepower.

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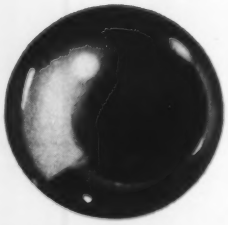

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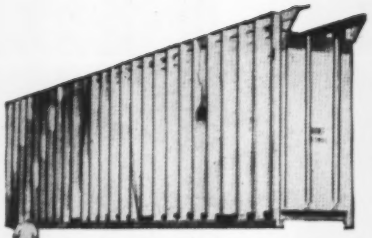

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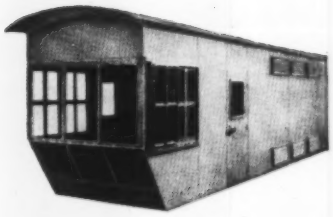
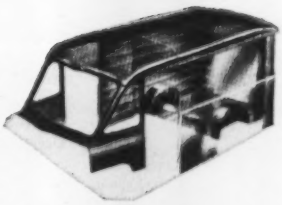


• Control House for Steel Mill



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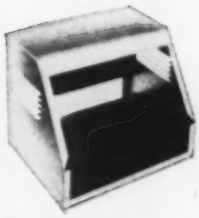
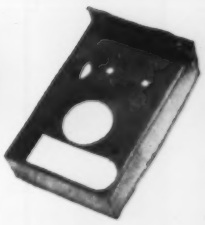
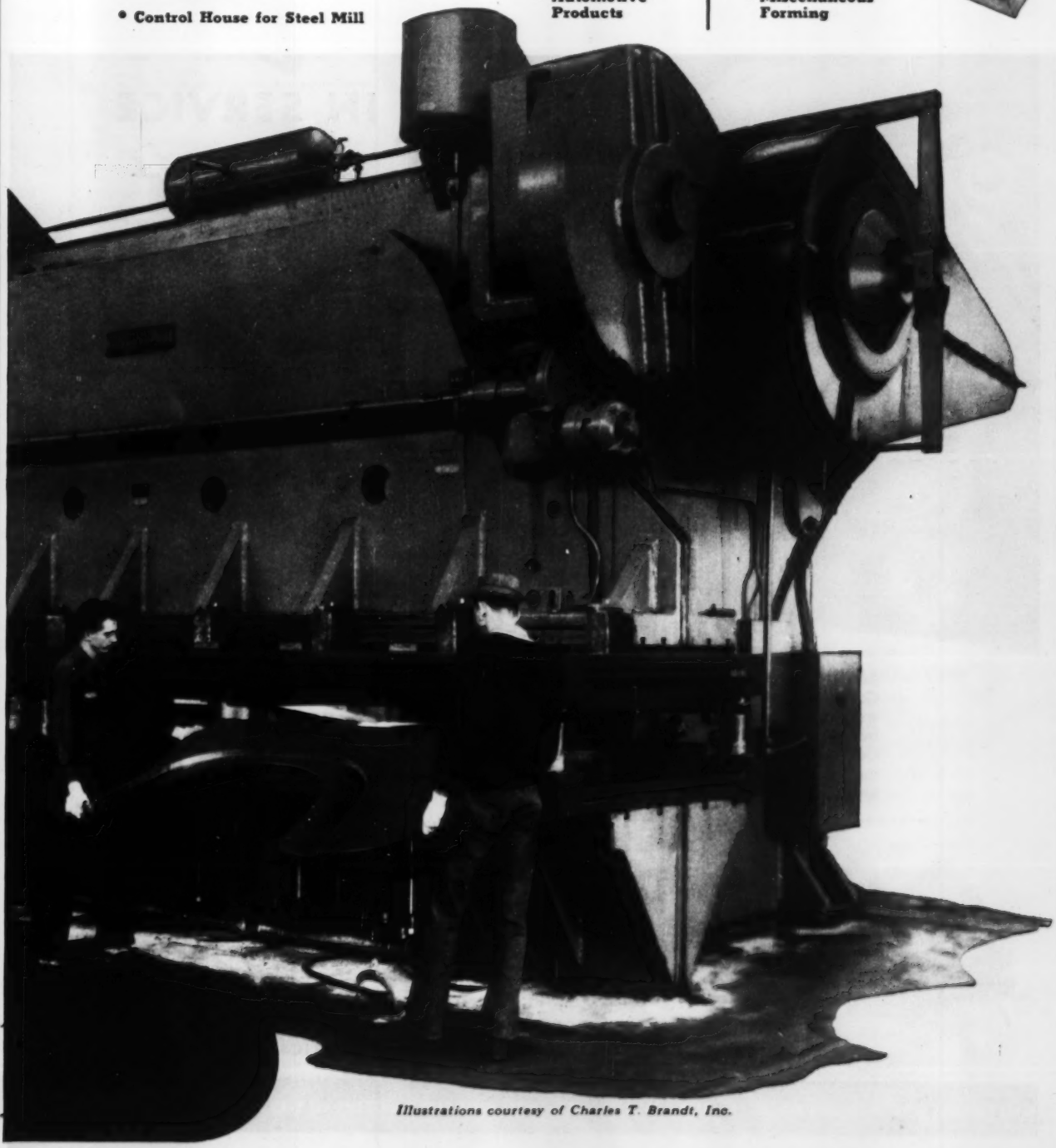




• Miscellaneous Forming



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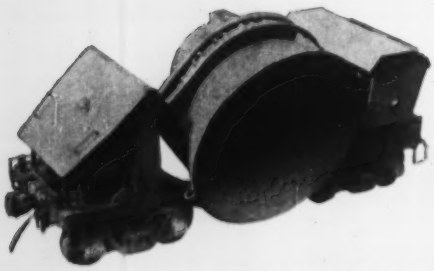

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CALENDAR
OF MEETINGS

May 10-12, Purdue Industrial Waste Conference, Purdue University, sponsor. Purdue Memorial Union, Lafayette, Ind. Information: Don E. Bloodgood, chairman, C. E. Bldg., Purdue University, Lafayette, Ind.

May 12-14, Porcelain Enamel Institute Inc.: Midyear divisional conference, Edgewater Beach hotel, Chicago. Institute address: 1346 Connecticut Ave., NW, Washington 6. Secretary: John C. Oliver.

May 16-19, American Institute of Chemical Engineers: Meeting, Hotel Kimball, Springfield, Mass. Institute address: 120 E. 41st St., New York 17. Secretary: Stephen L. Tyler.

May 16-19, Industrial Furnace Manufacturers Association Inc.: Spring meeting, The Homestead, Hot Springs, Va. Association address: 412 Fifth St. NW, Washington. Secretary: T. F. Sheckels.

May 17, American Coke & Coal Chemical Institute: Regional meeting, Westchester Country Club, Rye, N. Y. Institute address: 711-14th St. NW, Washington 5. Secretary: S. S. Robinson.

May 17-19, American Institute of Electrical Engineers: Appliance technical conference, Morrison hotel, Chicago. Institute address: 33 W. 39th St., New York 18. Secretary: N. S. Hibshman.

May 17-19, National Industrial Distributors Association: Annual meeting, Hotel Waldorf-Astoria, New York. Association address: 1900 Arch St., Philadelphia 3. Secretary: H. R. Rinehart.

May 17-20, Basic Materials Exposition: International Amphitheatre, Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17.

May 19-21, Gas Appliance Manufacturers Association: Annual meeting, Drake hotel, Chicago. Association address: 60 E. 42nd St., New York 17. Managing director: H. Leigh Whitelaw.

May 19-21, American Institute of Electrical Engineers and American Welding Society: Electric welding conference, Hotel Schroeder, Milwaukee, Wis. Information: R. E. Young, publicity chairman, 1954 AIEE Welding Conference, 388 E. Court St., Kankakee, Ill.

May 20, Anti-Friction Bearing Manufacturers Association Inc.: Annual meeting, Westchester Country Club, Rye, N. Y. Association address: 60 E. 42nd St., New York 17. Secretary: H. O. Smith.

May 20-21, National Industrial Conference Board: General session for all associates and annual meeting of board members, Hotel Waldorf-Astoria, New York. Board address: 247 Park Ave., New York 17. Secretary: Herbert S. Briggs.

May 23-26, National Association of Purchasing Agents: Annual meeting and exhibit, Hotel Conrad Hilton, Chicago. Association address: 11 Park Place, New York. Secretary: G. A. Renard.

May 24-26, Automotive Engine Rebuilders Association: Annual meeting and conference booth program, Hotel Statler, Buffalo. Association address: 419 N. Capitol Ave., Indianapolis 4. Executive vice president: R. G. Patterson.

May 24-27, National Office Management Association: International conference and office machinery and equipment exposition, Kiel Auditorium, St. Louis. Association address: 132 W. Chelten Ave., Philadelphia 44. Executive vice president: W. H. Evans.

May 25-28, Industrial Diamond Association of America Inc.: Annual meeting, Hotel Claridge, Atlantic City, N. J. Association address: 124 E. 40th St., New York. Executive manager: Athos D. Leveridge.

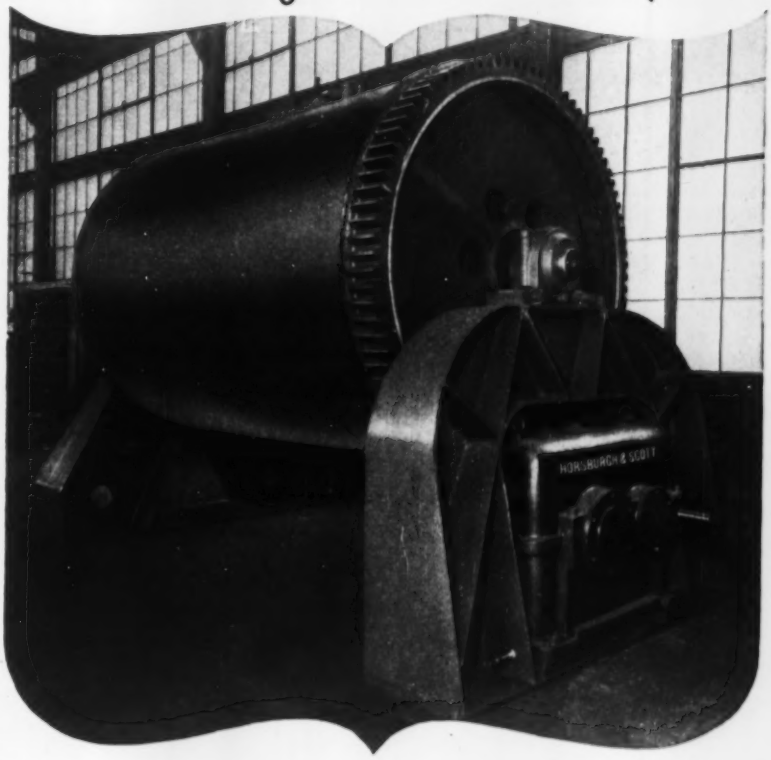
May 25-28, National District Heating Association: Annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Association address: 287 N. Euclid Ave., Pittsburgh 6. Secretary-treasurer: John F. Collins, Jr.

May 31-June 11, Canadian International Trade Fair & National Air Show: Exhibition Park, Toronto, Canada. Director of the Trade Fair: Glen Bannerman.

H & S SPEED REDUCERS

save maintenance and space with

Greater safety



• Since 1940 the Horsburgh & Scott Herringbone Speed Reducer illustrated above...driving an Epworth Manufacturing Company Ball Mill in a large paint manufacturing plant... has been in operation with *no* repairs necessary. The service is severe with heavy starting load and the machine operates continuously for periods of 24 to 72 hours. As compared with the old drives the results are: greatly reduced maintenance and space... greater safety is also an important feature. H & S Speed Reducers offer many savings and advantages throughout the range of industry...it will pay you to investigate.

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVE. • CLEVELAND 14, OHIO, U.S.A.

Send note on Company Letterhead for Speed Reducer Catalog 46

You may be throwing away your profits...

with out-of-date instruments

The tremendous progress in instrumentation that has come out of Honeywell's intensive development program has made many older instruments obsolete. Modernizing your plant instruments, to take full advantage of this progress, can bring you a number of specific benefits.

You can save labor . . . by utilizing centralized control, automatic time-cycle systems and other concepts that save steps and reduce routine man-hour expenditures. You can cut maintenance . . . by installing instrumentation that is not only easier to service, but also requires the absolute minimum of attention. You can reduce rejects . . . because modern controls can maintain the tighter processing tolerances needed for today's exacting specifications. You can improve product quality. And you can make your cost accounting more accurate than ever before.

Replacing old instruments with new can well prove one of the best ways to invest your modernization appropriation. A Honeywell application engineer will be glad to survey your present plant instrumentation. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*,
Wayne and Windrim Avenues, Philadelphia 44, Pa.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

New facts for your file on

USS STAINLESS STEEL

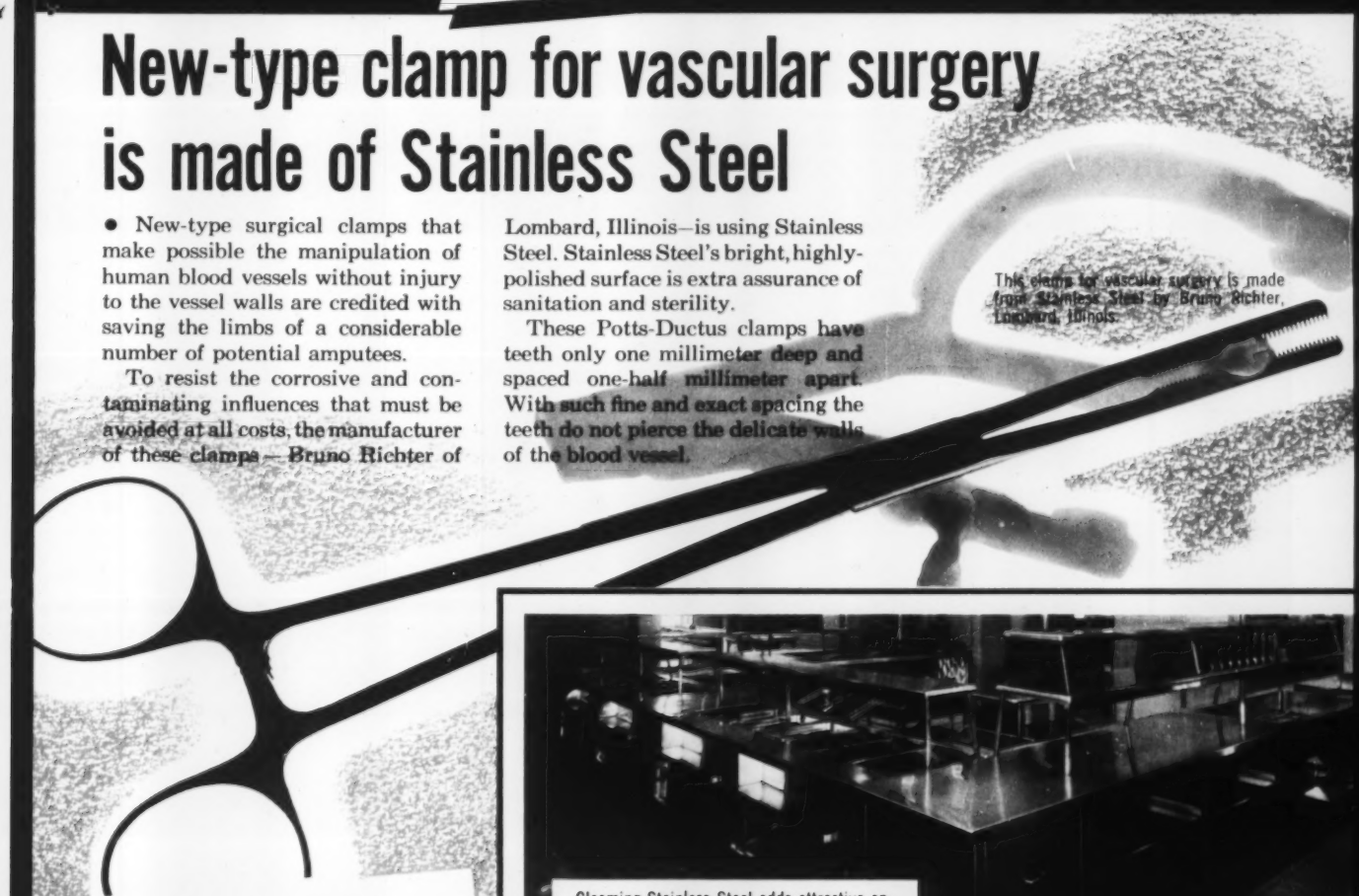
SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

New-type clamp for vascular surgery is made of Stainless Steel

• New-type surgical clamps that make possible the manipulation of human blood vessels without injury to the vessel walls are credited with saving the limbs of a considerable number of potential amputees.

To resist the corrosive and contaminating influences that must be avoided at all costs, the manufacturer of these clamps—Bruno Richter of Lombard, Illinois—is using Stainless Steel. Stainless Steel's bright, highly-polished surface is extra assurance of sanitation and sterility.

These Potts-Ductus clamps have teeth only one millimeter deep and spaced one-half millimeter apart. With such fine and exact spacing the teeth do not pierce the delicate walls of the blood vessel.



This clamp for vascular surgery is made from Stainless Steel by Bruno Richter, Lombard, Illinois.

Gleaming Stainless Steel adds attractive appearance and a host of other benefits to the employee cafeteria at H. J. Heinz Company, Pittsburgh. It was fabricated by Tyson Metal Products Company, Pittsburgh.

Stainless Steel's ease of cleaning makes it best for cafeteria use

Food handling is a "natural" for Stainless Steel. Stainless gives you an unmatched combination of sanitary qualities, ease of cleaning, a smooth, non-porous surface, resistance to corrosion and long life.

This cafeteria equipment was fabricated for H. J. Heinz Company, Pittsburgh, Pa., by Tyson Metal Products Company, Pittsburgh. It is made of a nickel-chromium grade of Stainless Steel.

Take advantage of Stainless Steel in your designs and in your selling

Here are more applications typical of the thousands in which Stainless Steel has been used to improve design and add sales appeal. The wide range of valuable properties available in Stainless Steel makes it the ideal material for many, many jobs.

Put Stainless to work for you. It will pay its own way and give you a good return on your investment—especially when it is perfected, service-tested U·S·S Stainless Steel.

USS

UNITED STATES STEEL CORPORATION, PITTSBURGH · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS

UNITED STATES STEEL

"We scrap 90 tons of steel

says John E. Williams
U.S. Steel
Open Hearth Pit Boss

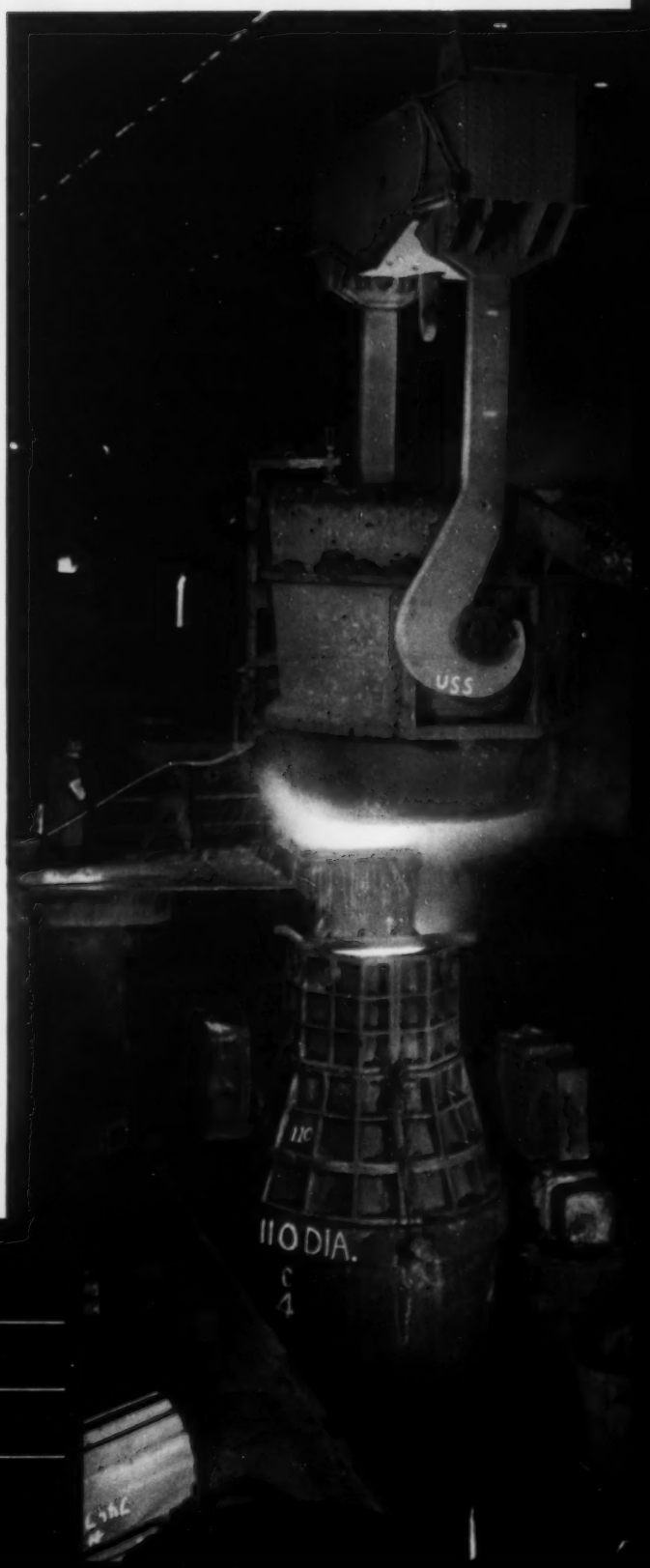
UNITED STATES STEEL

to make a better forging"

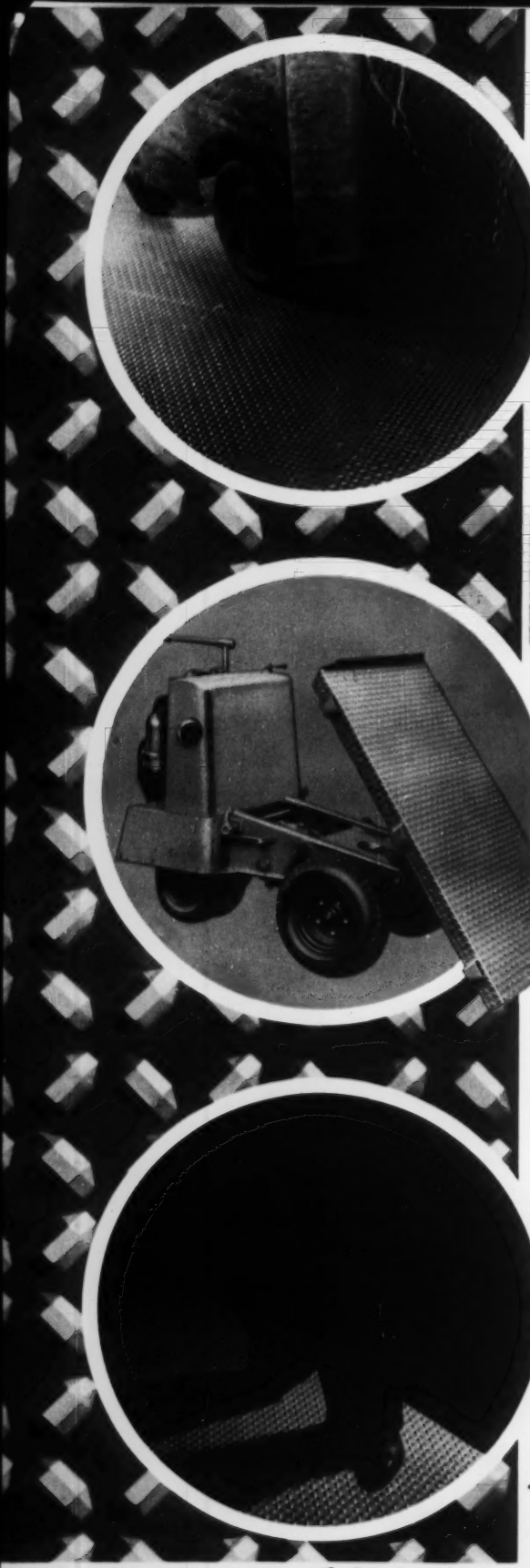
• In his role as Pit Boss, John E. Williams is responsible for the pouring side of the open hearth and the thousand and one details involved before the furnace is tapped and the molten metal poured into ingots. He is shown here supervising the pouring of a 110-inch-diameter forging ingot at our Homestead Forgings Division. This gigantic ingot mold is filled with 525,000 pounds of alloy open hearth steel—yet it is poured as *one heat* from a *single furnace.*

Look again at the ingot mold in the picture. As the ingot is forged, we will cut off and discard the top 25%—as well as approximately 10% from the bottom of the ingot—over 180,000 pounds of steel. The top of the ingot may be spongy and full of "pipes." Therefore, we scrap this steel and use only the dense center section. The bottom portion may contain impurities, so it too must be discarded. In a very real sense, the quality of a forging is often determined by how much of the ingot is thrown away, and we throw away plenty.

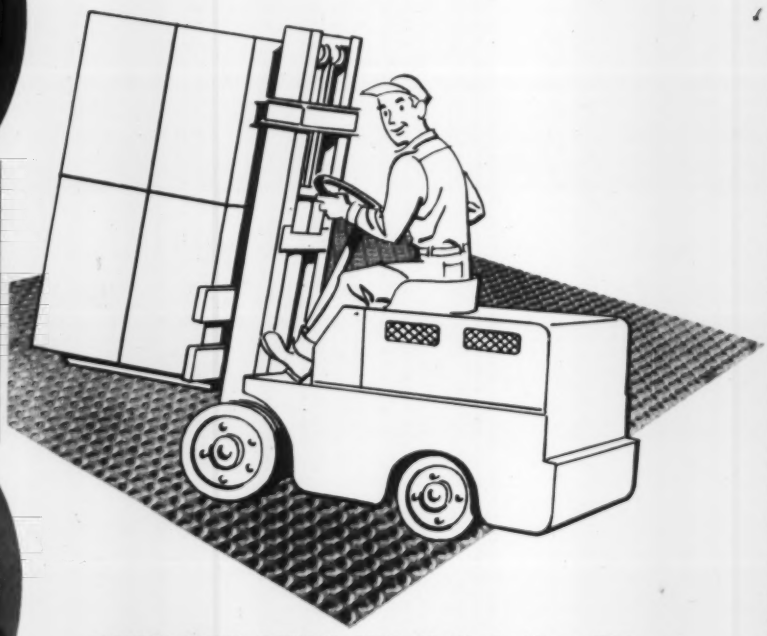
Write today for our free 32-page booklet that describes the steel, the machines and the men that produce every USS Quality Forging. Address inquiries or requests for the booklet to United States Steel, Room 4367, 525 William Penn Place, Pittsburgh 30, Pa. 4-237



USS Quality



We make *Multigrip* to help you stop
Costly accidents in your plant or shop:
To help you reduce the extra cost,
Of slips and falls and man-hours lost.
And frequent repairs and replacing the floor,
Will be things of the past to plague you no more.
So for long, cost-less life with none of these cares,
Install Multigrip . . . on floors, aisles and stairs.



DOUBLE-DUTY DESIGN. USS Multigrip Floor Plate was carefully developed to help remedy two of the most costly problems in any plant operation:

The first is accidents caused by slips and falls. Multigrip's right angle, non-skid risers assure sufficient traction for workers (and vehicles) at all times, from all directions. And, since these risers are flat-topped, they are comfortable to walk and work on. This helps reduce fatigue, another big accident provoker.

The second is costly repairs and frequent floor replacement. Multigrip is rugged, heavy-duty steel and, whether used structurally or as covering for existing floors, it will give trouble-free service for years and years. It will not crack and chip or rot and splinter as other flooring materials do.

In addition, there's no problem in keeping Multigrip clean. There are no niches where dirt can hide from the broom or hose. Drainage is quick and complete in all directions. Large sections and symmetrical design make it a fast, simple job to install Multigrip, and with considerably reduced cutting waste.

UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, CHICAGO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS multigrip

FLOOR PLATE

USS TRADE MARK

Sold by leading distributors from coast to coast

4-1070

UNITED STATES STEEL

Enthonics* AT WORK

no doubt about it when you BLACKEN METALS with EBONOLS®

The **EBONOL SYSTEMS** for blackening metals are based on thorough technical knowledge plus extensive chemical and metallurgical research and years of use in industry. As a result, you can be **sure** that **Ebonols** will produce finishes of the uniform high quality that your product deserves, at the lowest possible cost.

We are exceptionally well equipped to study your specific requirements and recommend a practical solution.

For **STEEL**

EBONOL "S" produces jet-black oxide coatings. Simple and economical to operate. Operating temperatures: EBONOL "S", 285-290°F.; EBONOL "S-30", 295-305°F.

For **COPPER and BRASS**

EBONOL "C", the quality black for these metals, meets all military specifications.

For **ZINC**

EBONOL "Z" produces a durable, deep, rich finish for zinc plate or zinc alloy castings. Dull or glossy black oxide coatings are formed in from 5 to 10 minutes at 160-180°F.

EBONOL "Z-80", a blackening process for zinc and zinc alloys, operates at room temperature.

WRITE US ABOUT Enthonics* as applied to ANY BLACKENING OR OTHER FINISHING PROBLEMS

ENTHONE INCORPORATED

METAL FINISHING PROCESSES

442 ELM STREET, NEW HAVEN, CONNECTICUT

ELECTROPLATING CHEMICALS

U.S. Patent Nos.
2,364,993
2,460,896
2,460,898
2,481,854

* *The Scientific Solution of Metal Finishing Problems*

®Reg. Trademark

Announcing...

Electromet's New Electrolytic Chromium Metal

FOR ADDING CHROMIUM TO

- HIGH-TEMPERATURE ALLOYS
- CORROSION-RESISTANT ALLOYS
- ELECTRICAL RESISTANCE ALLOYS
- NON-FERROUS METAL-CUTTING TOOLS
- CHROMIUM BRONZES
- HARD-FACING MATERIALS
- HIGH-STRENGTH ALUMINUM ALLOYS

Now, for the first time, electrolytic chromium metal is commercially available in tonnage quantities. It is being manufactured in ELECTROMET's new Marietta, Ohio plant. *Electrolytic chromium can be advantageously used whenever additions of chromium of low iron content are needed.*

For further information about electrolytic chromium metal and other ELECTROMET ferro-alloys and metals, please contact the nearest ELECTROMET office listed below.

The term "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation.

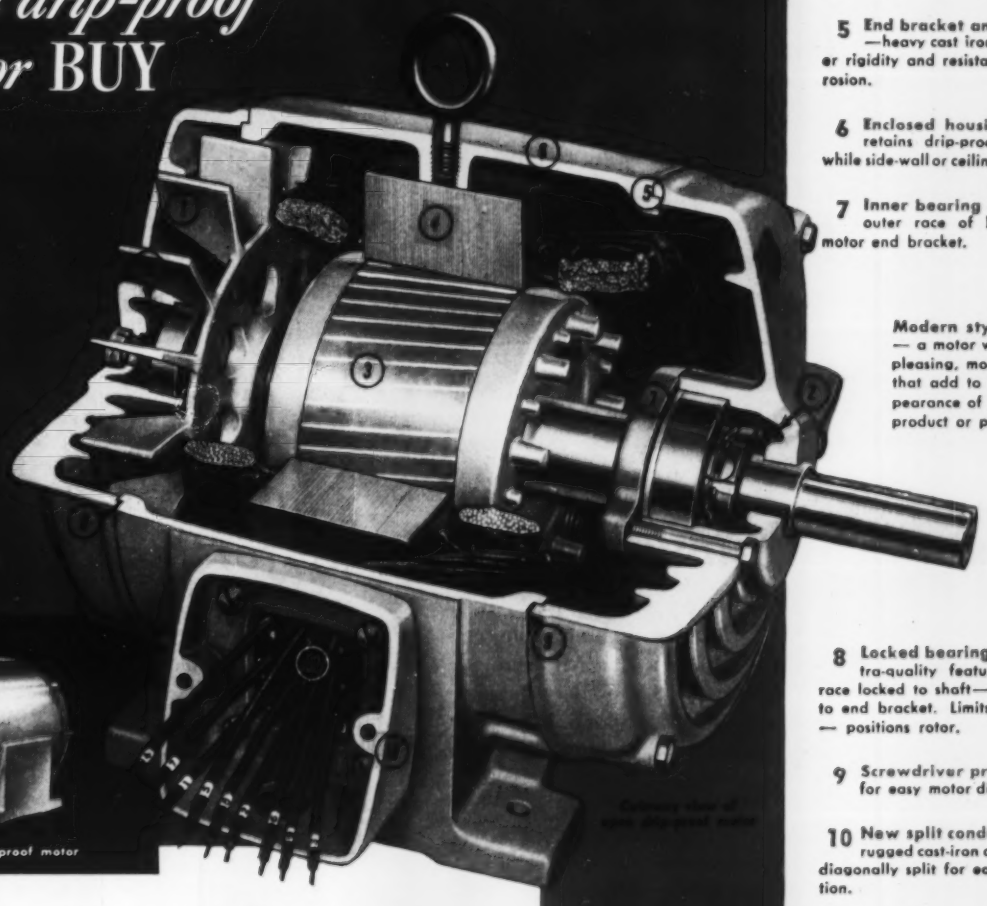
ELECTRO METALLURGICAL COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
OFFICES: Birmingham • Chicago • Cleveland • Detroit
Houston • Los Angeles • New York • Pittsburgh • San Francisco
In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Welland, Ontario

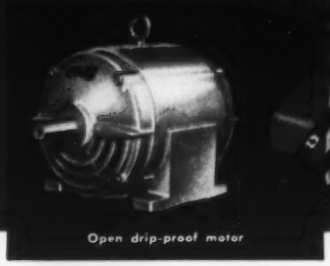
Electromet
TRADE-MARK
Ferro-Alloys and Metals

Here's the inside story of the

NEW L.A. *Line*

...your BEST *open drip-proof motor* BUY





Open drip-proof motor

1 Fan — efficient, non-sparking fan. New aerodynamic design for more effective cooling.

2 Large grease chamber — factory lubricated for years of attention-free service.

3 Indestructible cast-aluminum rotor — dynamically balanced with fan for smooth, quiet operation.

4 Stator — prewound stator core utilizes Formvar wire insulated with a new Alkyd Asphalt Resin insulating varnish.

5 End bracket and housing —heavy cast iron for greater rigidity and resistance to corrosion.

6 Enclosed housing —motor retains drip-proof features while side-wall or ceiling mounted.

7 Inner bearing cap — locks outer race of bearing to motor end bracket.

Modern styling — a motor with pleasing, modern lines that add to the appearance of your product or plant.

8 Locked bearing — an extra-quality feature. Inner race locked to shaft—outer race to end bracket. Limits end play — positions rotor.

9 Screwdriver pry slots — for easy motor disassembly.

10 New split conduit box— rugged cast-iron conduit box diagonally split for easy connection.

11 Lead identification — permanent, positive lead identification spacer in conduit box plus lead tagging.

Here is the new L.A. open drip-proof motor. It's completely redesigned inside and out to meet new NEMA standards. You get the advantages of Louis Allis's 52 years of motor building experience.

This motor is better protected, more drip-proof . . . has new bearing construction and improved insulation. Learn about these and the many other features of the new L.A. Line. Call your nearby Louis Allis Sales Engineer for information on this and our complete motor line.

THE LOUIS ALLIS CO.
MILWAUKEE 7, WISCONSIN

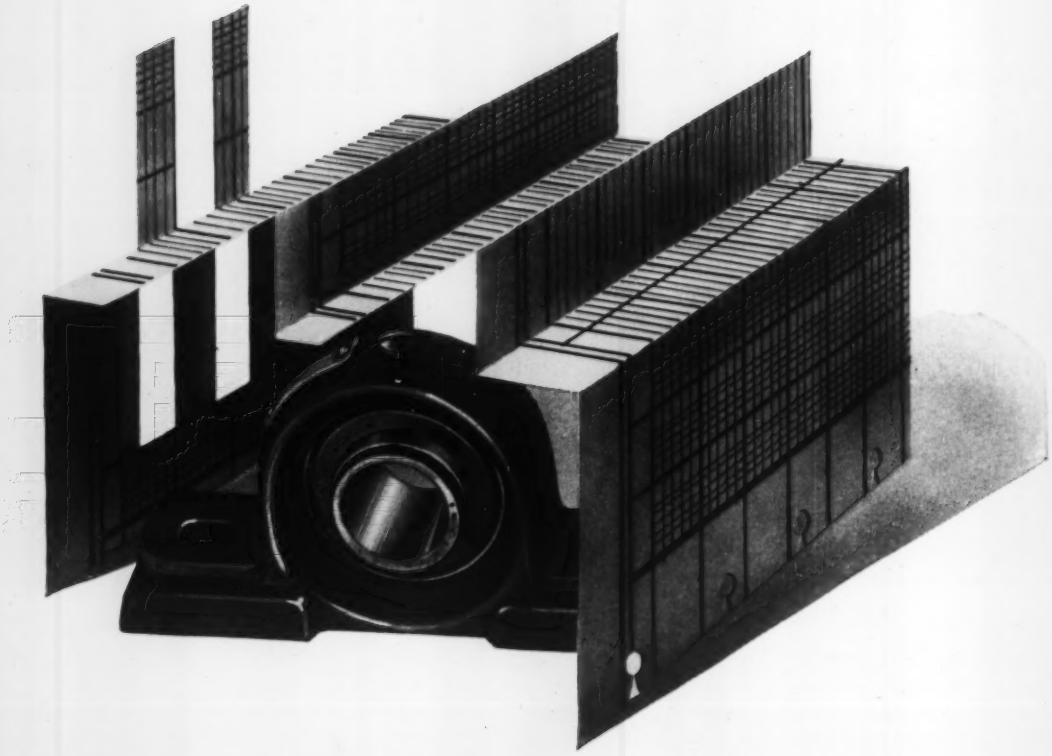
LA-104

NEMA D-flange motor

Vertical NEMA C-flange motor

We specialize in SPECIAL MOTORS *and* PROMPT DELIVERY, TOO

NEMA C-flange motor



LOW-COST HOUSING PROJECT . . . *for management!*

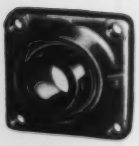
If it hadn't been for a *housing* problem, industry might have modernized years ago with ball bearings . . . in plant equipment as well as products. There never was any question of the advantages of ball bearings for power transmission. But, bearings must be housed, and housings were often complicated and costly to design.

Then Fafnir developed a line of transmission units which included both housings and provision for lubrication. These ready-to-use "packaged" bearings offer all the advantages of ball bearing performance — savings in power, increased production and lower maintenance costs. Easy to install, Fafnir "Economy Packages" come in shapes and sizes to fit a great variety of machines and equipment.

Here is another instance of the Fafnir attitude and aptitude for solving bearing problems. It's a way of looking at bearings from the user's point of view — an ability to come up with the right bearing to fit the need.

This "you" approach to ball bearing design (in which *top quality* is not the end but only a beginning) could have an important bearing on your problem. Fafnir's experience, remember, is more than 40 years long — and industry *wide*. The Fafnir Bearing Company, New Britain, Conn.

FAFNIR ECONOMY PACKAGES . . .
These units, equipped with precision bearings, are complete with housings, seals and shields, ready to mount.



FLANGE CARTRIDGES . . . standard and heavy series

CYLINDRICAL CARTRIDGES . . . standard and heavy series

PILLOW BLOCKS . . . standard and heavy series

More than top quality in ball bearings ...it's what Fafnir has on the ball

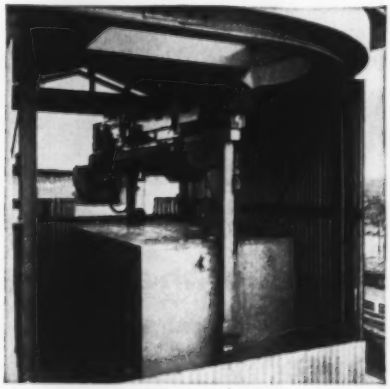
FAFNIR

BALL BEARINGS

MOST COMPLETE LINE IN AMERICA

AUTOMATIC "UP AND OVER"* TRANSFER

Three boxes—450 lbs. each—are loaded in car. When doors are closed the car raises to carrier.

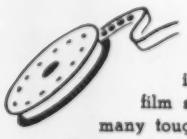


When car reaches upper limit, the Mono-Tractor propels carrier on the MonoRail to No. 2 mill.

SAVES $30,000 PER YEAR

Here is an "Up-and-Over"* system that eliminates 72 hours of handling labor per day. It automatically transfers 180 full bobbin boxes from three floors of one mill to one floor of another and returns the empties. Estimated savings in labor, trucks, floors and traffic congestion run upwards of $30,000 per year.

It is another of the many examples of American Mono-Rail engineering for low-cost handling within space limitation. Let one of our field representatives explain further the versatility and low maintenance of American Mono-Rail equipment.



*"UP-AND-OVER"

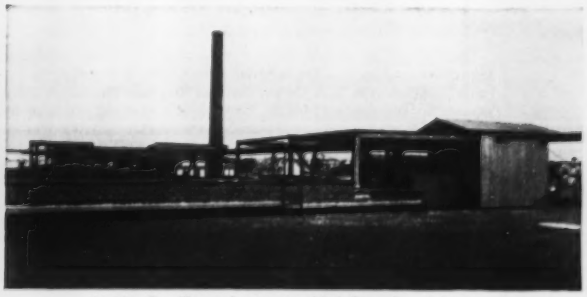
is the title of our 16-mm. sound film showing how MonoRail solves many tough handling problems. Please allow us three weeks to schedule showing.

AMERICAN OVERHEAD HANDLING EQUIPMENT

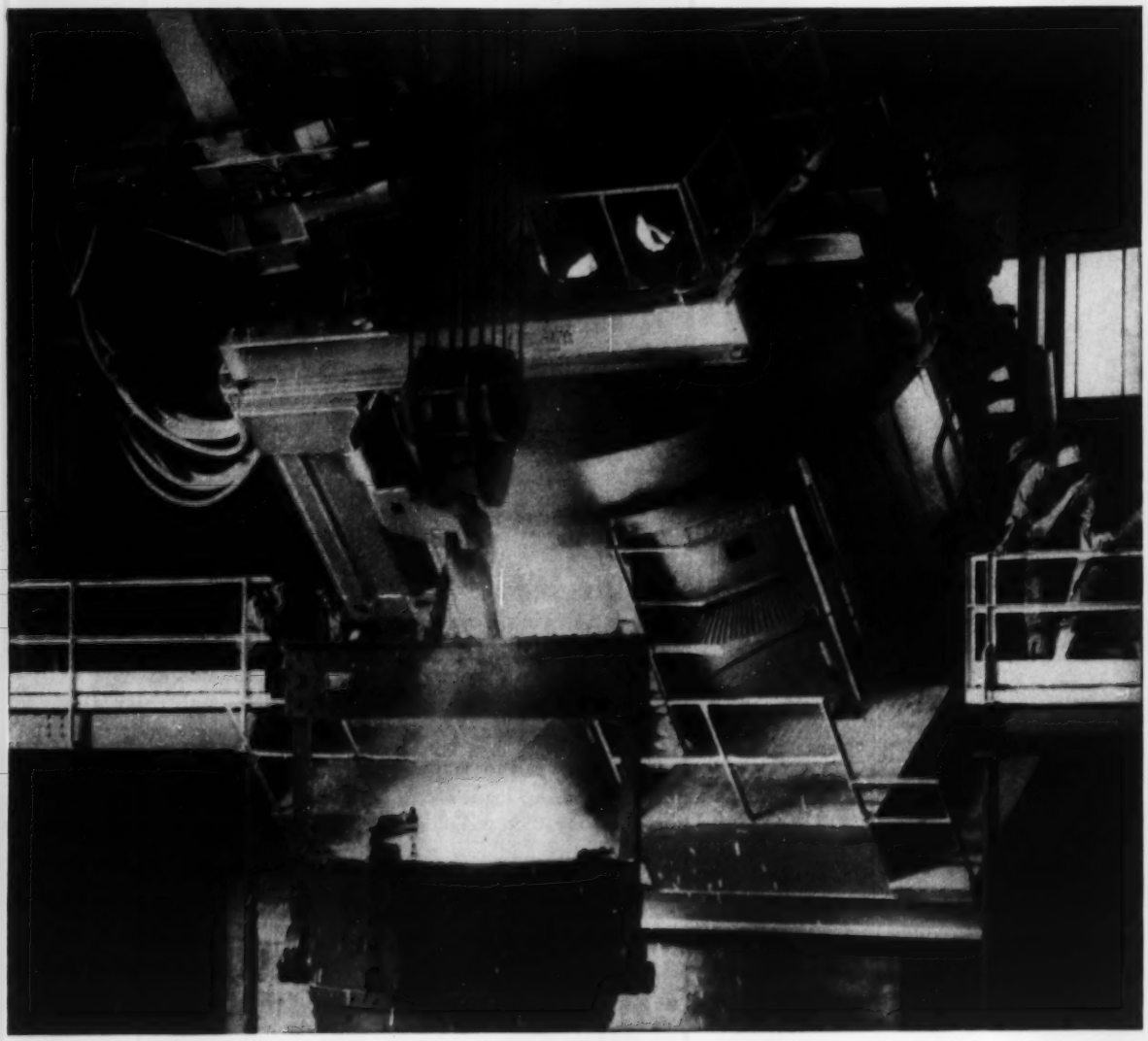
MONORAIL COMPANY

13102 ATHENS AVENUE • CLEVELAND 7, OHIO

Carrier travels at 50 f.p.m. around curves—150 f.p.m. on straight track with slow approach at towers.



At No. 2 mill car lowers to third floor for delivery of full boxes and return dispatch of empties.



Lectromelt FURNACES...preferred all over the world

Its many outstanding features have made Lectromelt the favored furnace in 35 nations for melting, smelting, refining or reduction.

- Power supply and power regulation are engineered specifically for each installation.
- Lectromelt provides more precise control of temperature and analysis.
- Top charging saves on labor, power, furnace lining and electrodes.
- Roof lift and swing mechanism is separately mounted.
- Lectromelt furnaces have a reduced inertia electrode mechanism.
- Tilt mechanism is side mounted.
- Each furnace is floor assembled in our factory for assured mechanical operation.

Pittsburgh Lectromelt Furnace Corporation, 323 32nd Street, Pittsburgh 30, Pa.

Manufactured in . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris... BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege... SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*

AL Stainless Steel Castings meet any need for Cleanliness

Here's New Data on

ALLEGHENY METAL

in Various Industries

1] Available *now*—informative booklets on Allegheny Metal in the Chemical, Petroleum Refining, Brewing, Meat, Dairy, Food Processing, Hospital, Laundry and Paper industries—others in preparation. *Write concerning the field(s) in which you are interested.*

2] Ask for a copy of our 32-page booklet on "Allegheny Metal Castings" for corrosion and heat resisting uses.

ADDRESS DEPT. S-53

Note the clean, sound, fine-grained appearance of the Allegheny Metal sanitary fittings shown above, in the "as-cast" condition. They're typical of the wide variety of stainless steel castings we produce for the chemical processing, food, dairy, beverage, oil, paper and textile industries, etc.—wherever the purity and quality of products must be maintained, and where ease of sanitation and assurance of long, trouble-free service are prime considerations.

Allegheny Metal castings are produced by methods specially developed to protect uniform quality and guard against defects. You'll find them superior both from the standpoint of machinability and soundness. ● Let us quote on your stainless casting requirements—any shape and any size, from a few ounces to 5000 pounds. *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

You can make it **BETTER** with

Allegheny Metal

W & D 44408

AL® TIME-TESTED STAINLESS STEEL

Powder-Cutting Saves $2,000

This 3-ton, 13-in. thick magnesium-bronze flywheel casting was reduced to furnace-charging size by powder-cutting in less than 8 hours. Previous methods required over 16 hr. to cut up a casting only 4-in. thick. Powder-cutting proved to be the most economical method for this job.

Powder-cutting replaced cold-sawing in this foundry operation, and did three times the cutting in half the time.

LINDE engineers were called in to help solve the problem of reducing giant flywheel castings to furnace-charging size. The castings had been part of an experimental program to develop accurately balanced flywheels for diesel engines. Test castings had to be cut for remelting. . . . But because of their great size, scrapping by formerly used methods would have been costly—if possible at all. LINDE advised powder-cutting.

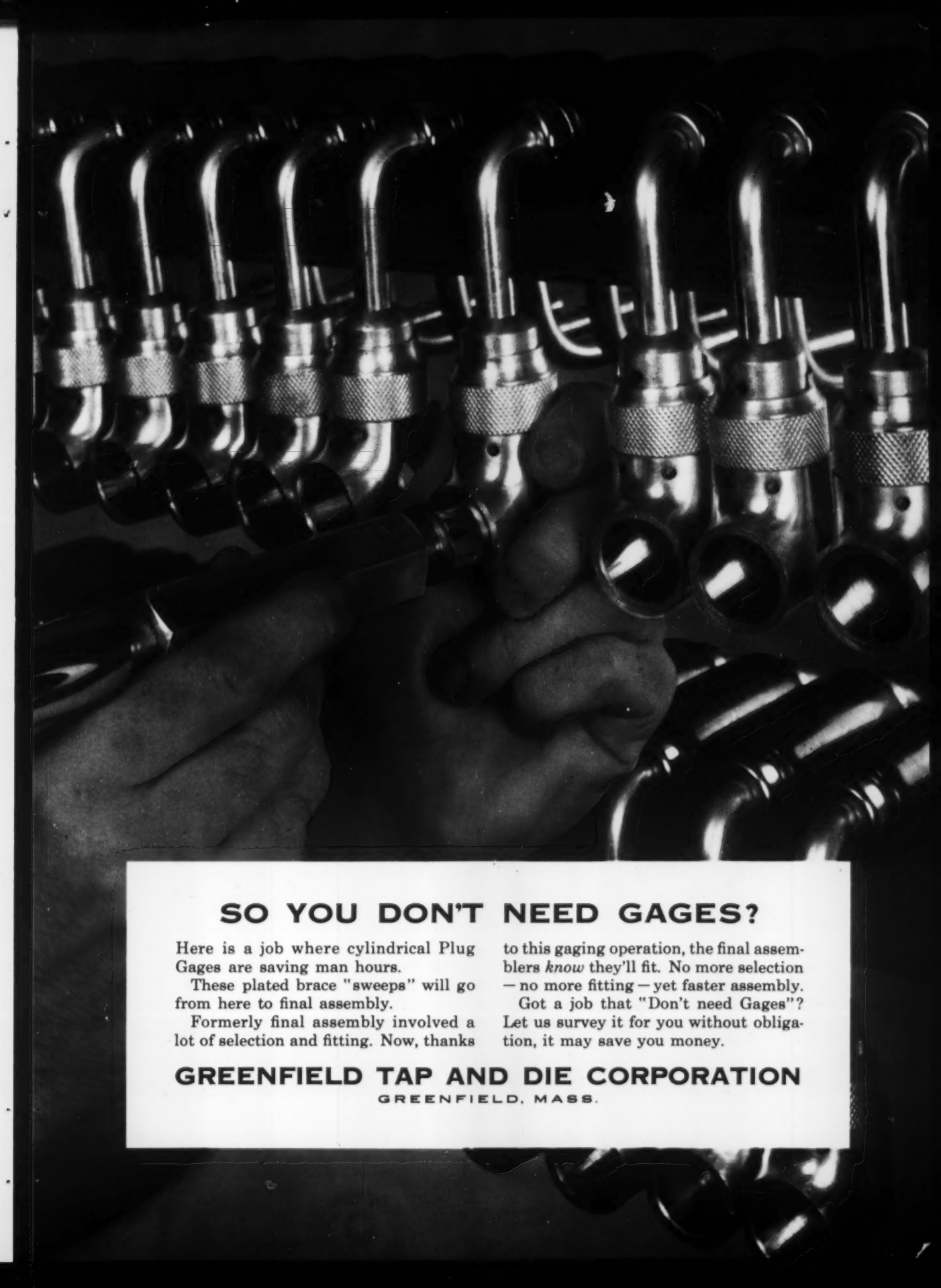
In powder-cutting, a powdered metal is added to the oxygen stream to raise the temperature of the cutting flame, and increase the speed of the severing action. Among other things foundries are using powder-cutting to remove gates and risers from stainless steel castings, to wash away sand-incrusted casting surfaces, and for gouging out defects prior to repair welding.

LINDE service engineers will be glad to help you determine the best powder-cutting setups or other uses of the oxy-acetylene process for your needs.

LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited

Linde Trade-Mark

"Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.



SO YOU DON'T NEED GAGES?

Here is a job where cylindrical Plug Gages are saving man hours.

These plated brace "sweeps" will go from here to final assembly.

Formerly final assembly involved a lot of selection and fitting. Now, thanks to this gaging operation, the final assemblers *know* they'll fit. No more selection — no more fitting — yet faster assembly.

Got a job that "Don't need Gages"? Let us survey it for you without obligation, it may save you money.

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASS.

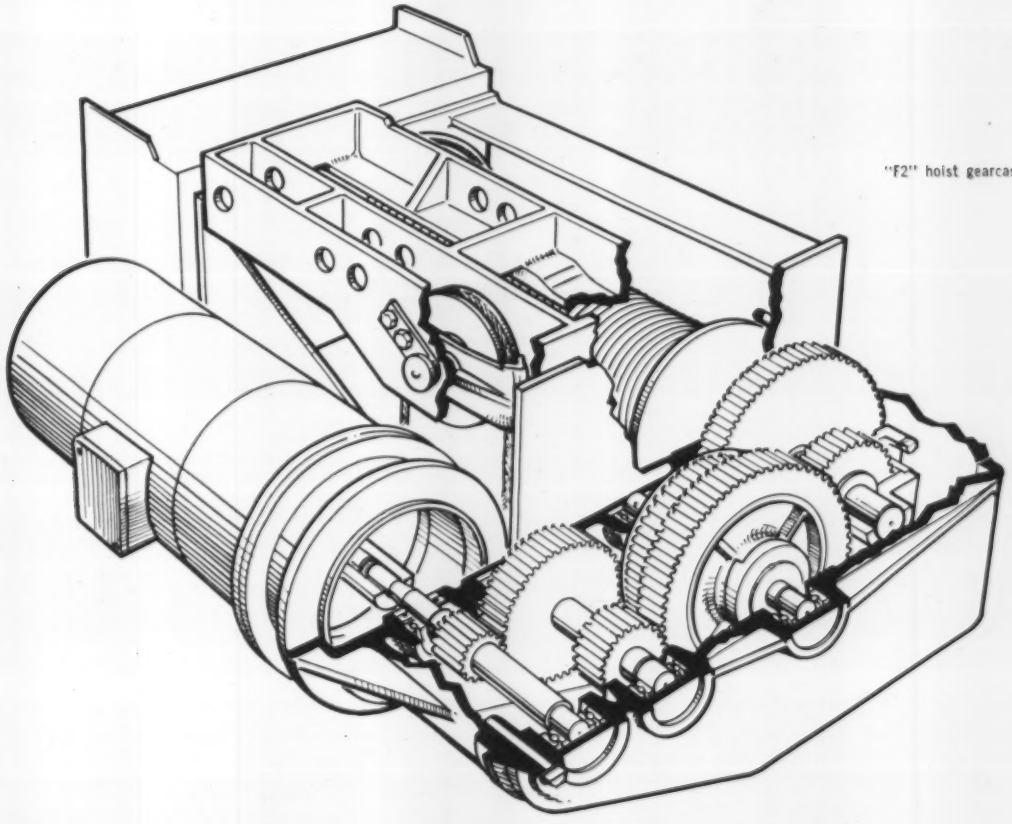
Quantity
PRODUCTION
of
GREY IRON CASTINGS

ONE OF THE NATION'S
LARGEST AND MOST MODERN
PRODUCTION FOUNDRIES

ESTABLISHED 1866

THE WHELAND COMPANY
FOUNDRY DIVISION

MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE



"F2" hoist gearcase

guts FOR ACTION

Robbins & Myers *F* hoists are built with guts for action – not an ounce of fat or extra frill inside – engineered simplicity that cuts downtime losses to zero. Search for cheap materials? Not here – Buy only the best – make parts precisely for the job. That's the procedure at R&M that saves you the high cost of compromise!

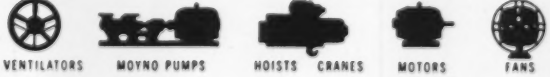
Result – the *F* hoist – the hoist with guts for today's competitive pace – the hoist that carries full loads all day – day after day, month after month. Long years after you've written it off, your *F* hoist will be pulling for you. *Capacities:* 1,000 to 20,000 lbs. *Hoist Speeds:* From 10 to 54 f.p.m. *Standard Lift:* From 16 to 40 feet. *Control:* Push button or Pendent Rope. *Mounting:* Lug, push or hand geared trolleys, or choice of long or short radius powered trolleys.

Two-ton "F2" hoist with motor driven trolley

take it up with

ROBBINS & MYERS, INC.

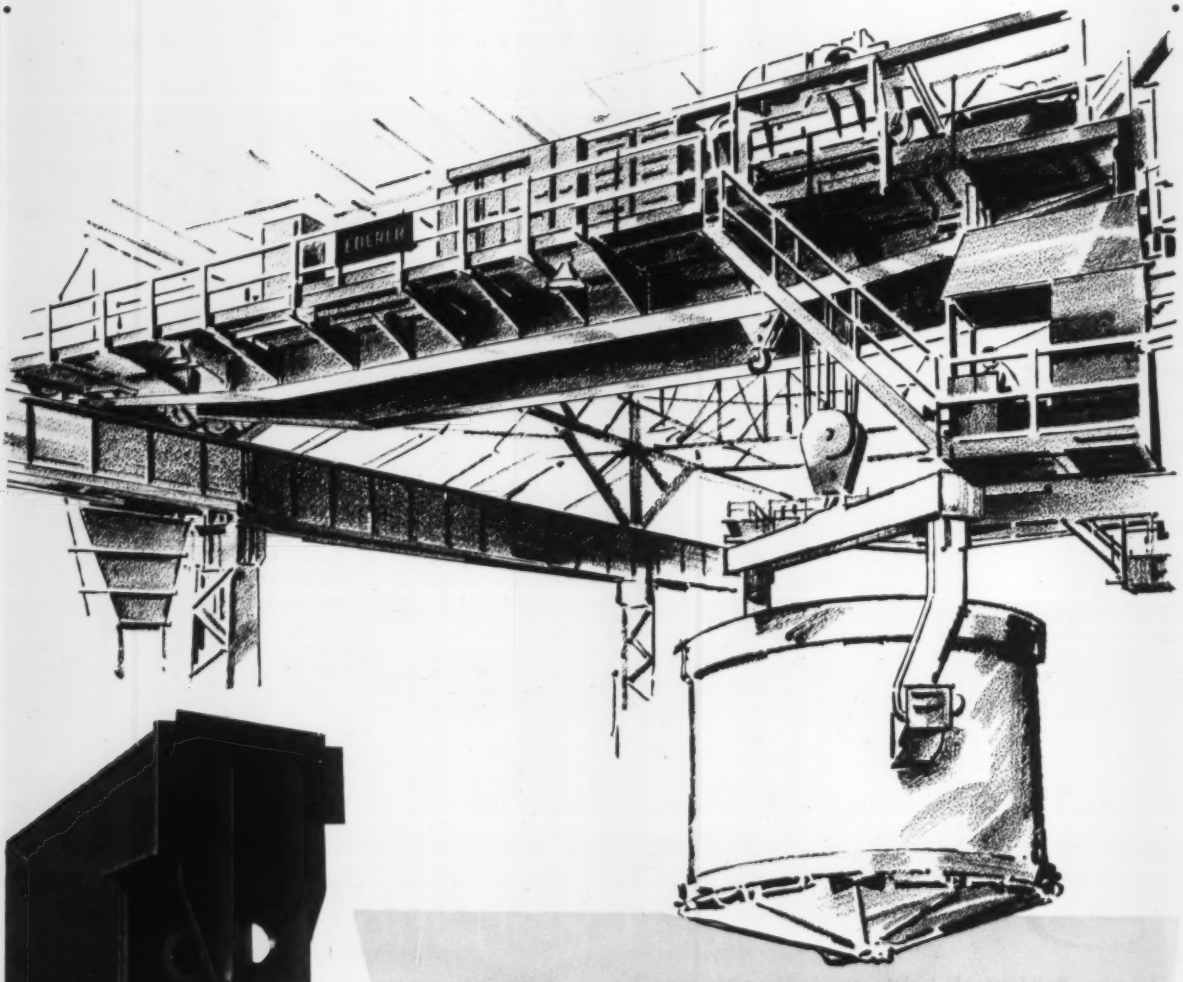
SPRINGFIELD, OHIO BRANTFORD, ONT.

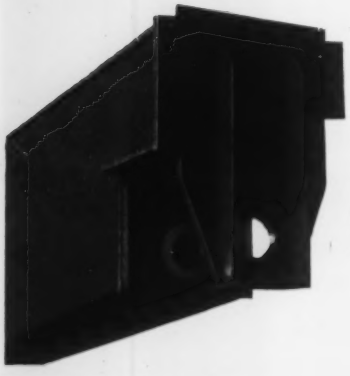


R&M

clip
staple to letterhead
add name and title

Have representative call ☐
Send F Bulletin No. 801-C ☐
Send trolley Bulletin No. 805-A ☐
Send 2-speed hoist Bulletin No. 880 ☐





This typical steel mill crane girder is all-welded box section, with end construction of heavy plate, saddle-type for connection to pony trucks.

These hoist gears and pinions are forged alloy steel with machine-cut teeth. Hoist has double brakes. Spherical roller bearings are used throughout.

When you say "Big Steel" —that means big cranes

The heaviest duty cranes made are those working in a steel mill—365 days a year—with no time down for maintenance. When an EDERER crane is "job-engineered" for this grueling service, it performs mightily, because a basic "plus" in all EDERER-built cranes is oversize construction throughout. Result? A big crane for a big job. EDERER can "job-engineer" a crane to give equally heavy duty performance in *your* plant. For more details, we'll be glad to send you the new EDERER crane catalog—Bulletin CR-610—upon your request.

264C54

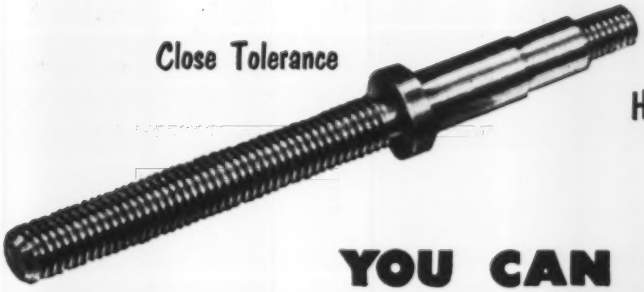
EDERER

CRANES

EDERER ENGINEERING COMPANY • 2935 First Ave. S., Seattle 4, Wash.

Export Division: 301 Clay St., San Francisco 11, Calif.

OVER 50 YEARS "JOB-ENGINEERING" CRANES FOR INDUSTRY



Close Tolerance

High Strength

YOU CAN HAVE ALL SIX ... PLUS *Uniform Machinability*

Fine Surface

Toughness

Hardenability

Maybe you want some of these properties in your steel parts. Or a combination of them. Or only one.

No matter which ones you need, you get them—plus *uniform machinability*—in Republic Cold Drawn Steels.

That's why so many manufacturers have come to Republic with their machining problems. Manufacturers whose costs and production records show their automatics aren't turning out what they could.

Republic's 3-D Metallurgical Service focuses the combined experience of the Field, Mill and Laboratory on your particular problem. And the recommendation you get is based on your plant, your product, and your equipment.

There's no reason to deny yourself this service. It costs only the price of a phone call to your nearest Republic office. And it can save you a lot. Do it today.

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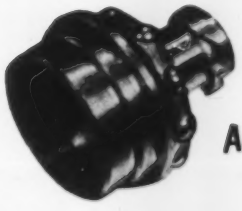

Accuracy of Section

REPUBLIC COLD DRAWN ALLOY STEEL BARS

REPUBLIC STEEL

Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Bars, Wire, Pig Iron, Steel and Plastic Pipe, Bolts and Nuts, Tubing

Sure, that old pump still works,

but how much does it cost to keep?

That rugged old pump of yours may not be the bargain that it seems. Let's do some arithmetic. If the efficiency of the old pump is 75% vs. the 85% efficiency of the new pump, you are paying more to keep it than you would to replace it. That's because a new unit of equivalent output uses less power. Thus it soon saves its own cost — then begins to pay dividends.

Let's take a specific example—a general service pump

Old pump efficiency 84%	**625 BHP**
New pump efficiency 89%	**590 BHP**
	35 BHP Saving

On the basis of 1¢ per KWH, the 35 BHP saving for a 5000-hour year (approximately 14 hours per day) amounts to $1300. This saving, capitalized in 4 years at 4% adds up to $5520. Yet the price of the new pump that saves $5520 is only $4054.

What would the pump replacement profit be in your particular case? Your De Laval representative can tell you exactly — in dollars and cents — as soon as he has the basic facts on your present installation. Call him in today or write to De Laval for Pump Fax Bulletin which includes a valuable "power-savings" chart.

DE LAVAL *Pumps*

DE LAVAL STEAM TURBINE COMPANY
860 Nottingham Way, Trenton 2, New Jersey

OL2317C

DRILL 1/2" - 4 HOLES 90° APART
Fx ALL "O" RING GROOVE SURFACES
Fx SQ WITH THD
1-14 NF THD
3/16 DRILL & 6 HOLES 60° ± 5° APART
Fx SEAT
STAMP PART No 611 4416
10.50
MILL 6 FLATS 60° APART .103-.09 DEEP (FLATS REQUIRED)
52 14219 - 1
MAXEL 3½" - 3.00 O.D. x 10.3/8" LONG
DESCRIPTION
STOCK
VALVE
TESTER
611 4416

intricately machined MAX-EL alloy steel part shows minimum distortion after heat treatment...

Halliburton Oil Well Cementing Company, Duncan, Oklahoma, selected hot rolled MAX-EL 3½ bar stock for the valve shown. It's an important part of their 5⅞" tester, used to sample fluids or gases during drilling operations, sometimes 15,000 to 20,000 feet below the surface.

The valve is machined in the annealed condition and then heat-treated. Even though it varies considerably in thickness, no distortion problems are encountered in this MAX-EL part.

Try MAX-EL in your shop. You'll like its better machinability, freedom from distortion and over-all quality. And you'll get longer tool life . . . more pieces per grind. Call Crucible for immediate warehouse delivery of MAX-EL steels.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **ALLOY STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DAYTON DENVER • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH PROVIDENCE • ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • ST. PAUL • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.

the hole story on

REAMERS

is service and control

accurate size, selective finish, maintenence, sharpening

. . . all are important to the number and quality of holes you ream. Singly or together, these factors control the cost and cutting life of your reamers.

Barber-Colman Reamers are designed and built to furnish you with control over all factors at all times. A highly trained reamer service organization responds promptly to your requests for assistance on special reaming problems.

Barber-Colman Reamers give you both . . . service and reamer control. Send prints for recommendation and specifications.

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GENERAL OFFICES AND PLANT, 965 ROCK STREET, ROCKFORD, ILLINOIS

pioneers in

reamer design
reamer finishes
reamer sharpening

ALL THE FEATURES *plus*....

MATCHED ENCLOSURES!

SQUARE D's NEW POWER-STYLE SWITCH BOARDS

DESIGN LEADERSHIP FEATURES

Distinctive Styling provides an attractive, modern appearance matching the control center design.

Easier Installation because removable front and back plates expose generous wiring parts. Isolated horizontal wiring trough has drop-off openings, assuring safer, neater wiring.

Flexibility. Complete sections or branch units can be added or changed to meet specific job requirements.

Easier Inspection and Maintenance. Front, side and back plates are removable, thus providing easy and immediate access to specific areas.

SEPARATELY.... OR AS A TEAM THEY DO THE JOB BETTER!

Write for Bulletin SD-18. Address Square D Company, 6060 Rivard Street, Detroit 11, Michigan.

SQUARE D's NEW PLUG-IN CONTROL CENTERS

DESIGN LEADERSHIP FEATURES

Increased Safety because bus bars are fully enclosed, rigidly supported and have ample cross section...circuits isolated by individually enclosed plug-in units...disconnect handle designed for maximum operator protection.

Flexibility. Individual plug-in units or complete sections can easily be added, removed or exchanged. Push-buttons, pilot lights, and selector switches can readily be added to unit doors.

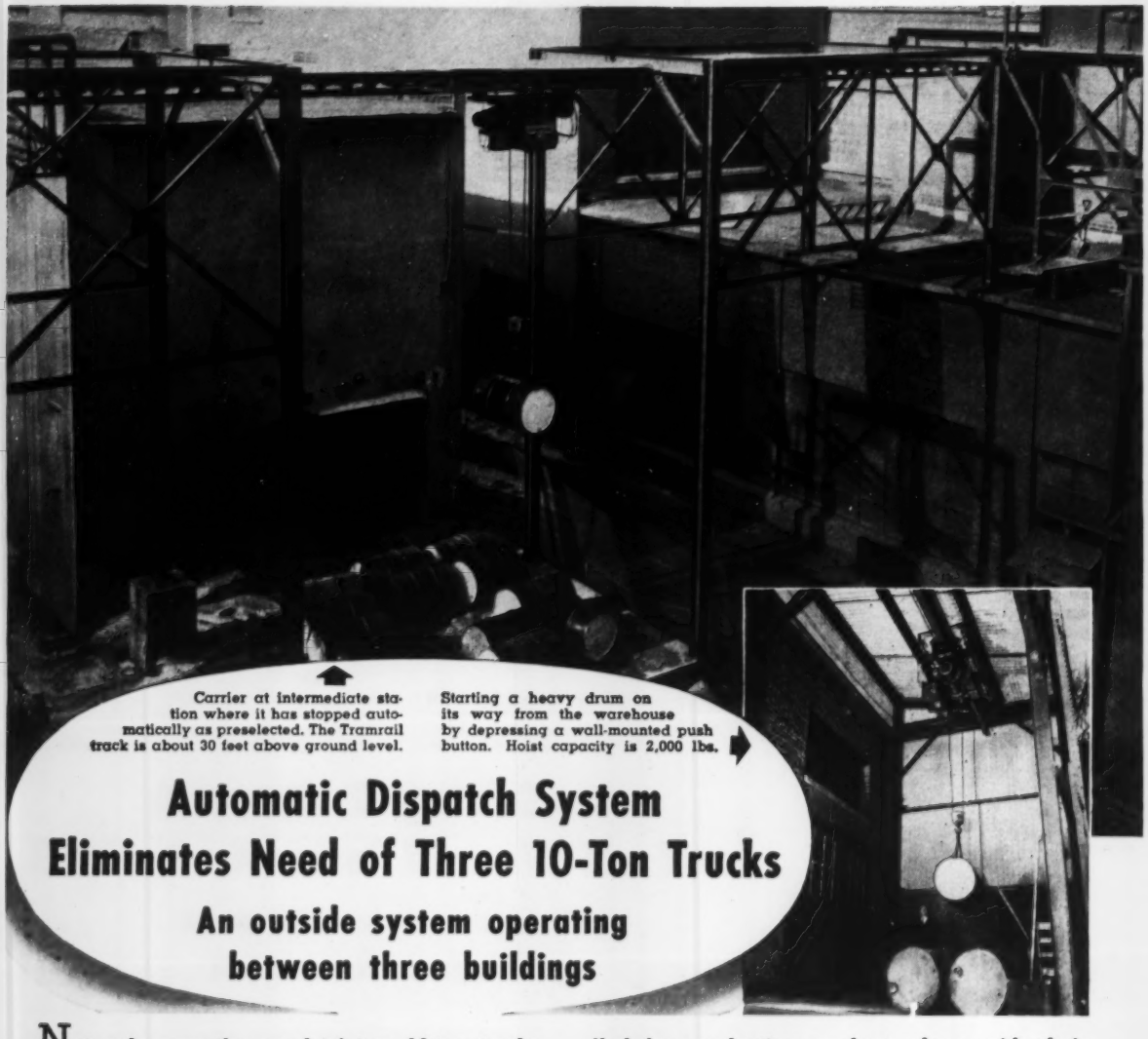
Installation Economy. All wiring channels are large and accessible from front without removing units...no "wire fishing."

Space economy, too. Up to six combination starters fit in a 20"x20"x 90" section. Plug-in unit heights are designed in space-saving increments of 3 inches.

Write for Bulletin 244. Address Square D Company, 4041 N. Richards St., Milwaukee 12, Wisconsin.

SQUARE D COMPANY

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS



Carrier at intermediate station where it has stopped automatically as preselected. The Tramrail track is about 30 feet above ground level.

Starting a heavy drum on its way from the warehouse by depressing a wall-mounted push button. Hoist capacity is 2,000 lbs.

Automatic Dispatch System Eliminates Need of Three 10-Ton Trucks

An outside system operating between three buildings

Not only was the need of two 10-ton trucks obviated by a Cleveland Tramrail automatic system at the Mica Insulator Company, Schenectady, N. Y., but the purchase of a third truck was made unnecessary. While the trucks had to travel over a circuitous route, only a short, straight Tramrail track is required for the overhead system.

Many man-hours of trucking and handling time are saved because materials dispatched over the automatic Tramrail system can be handled by production workers along with their regular jobs. A great amount of handling on an elevator has also been eliminated and better elevator service is available for other purposes.

The system has been found particularly helpful during night shifts when an extra drum of varnish or roll of cloth is sometimes needed. Formerly trucks were never available for night hauling. The Tramrail equipment paid for itself out of savings it created in a short period.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7865 East 284th Street, Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Interested in Cost Reduction?

Production Facts

you should know about Alcoa® Aluminum Impact Extrusions

HYDRAULIC LANDING GEAR CYLINDER . . . TYPICAL OF HIGH-STRENGTH LIGHTWEIGHT PARTS . . . MASS-PRODUCED AS LOW-COST ALCOA IMPACTS

Since 1946, Alcoa has produced many millions of aluminum parts by impact extrusion. These parts have been used in business machines, textile spools, blow torches, pneumatic tools, lighting fixtures, sump pumps, fire extinguishers, calking guns, household appliances, giftware and toys, as well as countless military items.

Press techniques have steadily improved. Now we can produce complex parts that could never have been made before, except by costly combinations of alternate methods. Now, too, we can impact extrude alloys having yield strengths as high as 55,000 psi, tensile strengths up to 65,000 psi. The hydraulic cylinder shell for jet aircraft landing gear, shown here, is typical. It is produced complete in a fraction of a second, drastically reducing cost per piece by eliminating machining and assembling operations once required.

Impact extrusion, though relatively new as a means of producing high-strength parts, is essentially quite simple. Tooling consists only of a punch and die usually on a crank press. After a slug has been placed in the die—either by hand or automatically—the descending punch forces the metal to cold-flow up and around the punch, or down, away from the punch, depending on the shape desired. The finished piece has a forged base and one or more extruded side walls.

Look now at the following pages which show why designers and engineers are choosing impact extrusion as the lowest cost method of producing many complex, high-strength parts.

Many Industries Today

use low-cost Alcoa Impacts

Aluminum alone will solve many design problems. It is light weight, strong, has good corrosion resistance, high electrical and thermal conductivity, and good machinability. By impact extrusion, certain shapes possessing all of these natural aluminum advantages can be produced faster and at less cost than by any other means.

In fact, few methods can compete with this process when fabricating round, square, rectangular, cup or shell-shaped pieces with ribbed, beaded or fluted side walls. Or, parts containing bosses, lugs, recesses or other projections.

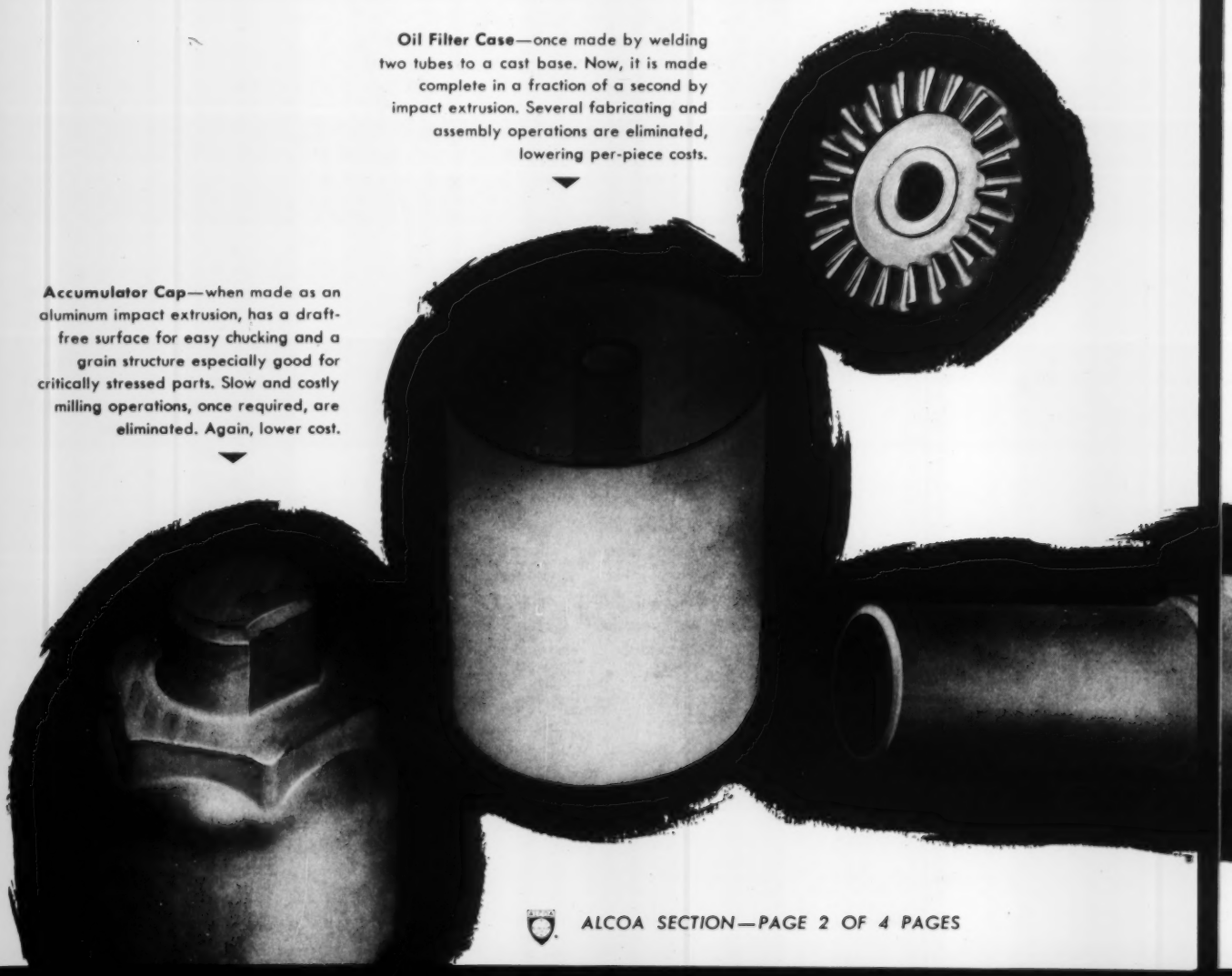
Mechanical Properties

Design requirements and mechanical properties of Alcoa Impacts are much the same as for forgings and extrusions. Surfaces are draft free, thus easily chucked if subsequent machining is required. Grain structure follows the outline of the piece, rendering it stronger than if machined from bar or rod.

Smoothness ranges between 40 and 250 micro-inches depending on the size and shape of the part, as well as the alloy selected. Alcoa Impacts are light weight, yet strong, which means high strength-weight ratios. When pay loads are a factor, high strength-weight ratios become increasingly important. Metal is efficiently distributed throughout Alcoa Impacts, making it possible to incorporate lugs, bosses or recesses with no sacrifice in strength.

Oil Filter Case—once made by welding two tubes to a cast base. Now, it is made complete in a fraction of a second by impact extrusion. Several fabricating and assembly operations are eliminated, lowering per-piece costs.

Accumulator Cap—when made as an aluminum impact extrusion, has a draft-free surface for easy chucking and a grain structure especially good for critically stressed parts. Slow and costly milling operations, once required, are eliminated. Again, lower cost.

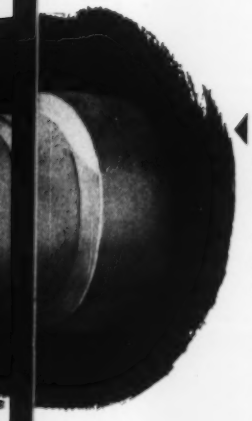


Alloy Selection

Many aluminum alloys can be used in Alcoa Impacts beginning with commercial purity 2S, on up to alloy 75S which develops a minimum tensile strength of 75,000 psi in the fully heat-treated (—T6) temper. It is important, however, to choose an alloy that most closely matches the mechanical requirements of your product. By doing so, forming pressures can be held to a minimum, keeping production speeds higher, costs lower.

Alloy 2S is most frequently used in Alcoa Impacts because it is the easiest to impact extrude, and in addition satisfies physical and mechanical requirements for a great many applications. For higher strength, Alloys A51S and 61S, usually furnished in the heat-treated tempers, are generally preferred. When specifying these alloys, try to avoid thin side walls and bases. Reason for this is that the metal cold-flows through an orifice between the die and punch. As that orifice increases in size, less pressure is needed thus keeping production speeds high and costs down. This is even more important when the still-higher strength alloys, 14S and 75S, are employed.

Coupling Flange—used in aircraft engines was once cast. Now, as an Alcoa Impact, it is much lighter, yet stronger. Surface finish is better than as cast; tolerances are closer. Production speeds are more than doubled. Costs are lower.



Fuse Sleeve—formerly machined from rod or tubing. As an Alcoa Impact, the Ordnance Department saves 40 per cent on raw materials as against machining from rod, 26 per cent as against machining from tube. And, with less metal needed to start, there is less scrap loss resulting in a radical saving in cost.

Production Tips

Alcoa Impacts of nearly any shape or alloy can be machined, pierced, flared, flanged or beaded. Their draft-free surfaces facilitate chucking. Their internal structure developed by cold-working produces better strength characteristics than if machined from rod or bar.

It is important, however, to use care in clamping or chucking Alcoa Impacts because of aluminum's natural tendency to "spring". Because of aluminum's high coefficient of expansion, it is important to maintain constant temperatures throughout the machining operation to assure dimensional stability. Proper coolant selection helps to minimize temperature variations. In fact, machining aluminum is easy if more rake angle is allowed on cutting tools than when machining steel. More space should be provided for chips. Tools should be sharp and smooth, free from scratches, and so designed that chips are directed away from the work. High speeds may be used with moderate feeds and cuts.

Many Alcoa Impacts are made of 2S alloy, the easiest of all alloys to weld. Resistance and fusion welding as well as the newer consumable electrode process are all commonly used. Alloy 61S is the most practical to join by gas welding, but because it is a heat-treatable alloy, welding should be done in one pass. Otherwise, like all heat-treatable alloys, it tends to crack at the weld seam. Avoid any such seam failure by using a tack weld, then, with the part still in the jig, loosen the clamps to reduce stress.

Alcoa Impacts can be easily riveted to other assemblies. For this purpose, there are many types of commercially available aluminum rivets suitable for the job—buttonhead, roundhead, mushroom head, brazier head and flathead. Use aluminum rivets to avoid the possibility of galvanic action and to provide uniform appearance. Nearly all aluminum rivets are driven in the cold condition. But, higher strength rivets of alloys 17S, 24S and 61S are reheat treated for easier driving.

Beading, flaring and flanging are all operations usually limited to Alcoa Impacts of alloys 2S and 3S. As stronger alloys are employed, these operations become proportionately more difficult to perform. But, for the lower strength alloys, they are excellent for purposes of adding strength, enhancing appearance, or for accommodating a seal.

Mechanical, chemical or electrochemical finishes can be applied to Alcoa Impacts. They can be dipped, polished, satin finished, enameled, lithographed or lacquered. Or, they can be finished in any one of a whole rainbow of colors by the Alumilite* process. Thus anodically treated, Alcoa Impacts have a harder surface than that which normally forms on aluminum, assuring long-lasting good appearance. The smooth surface on all Alcoa Impacts, regardless of alloy, takes all these finishes well.

*Trade Name of Aluminum Company of America

Alcoa Impacts–

what's in the future?

Few fabricating methods in use today can consistently produce shapes with such true dimensional fidelity as fast and at such low cost as impact extrusion. Yet, results from latest tests by Alcoa research engineers hold promise that tolerances and costs will be improved still more. Years of highly successful production experience on parts of high-strength alloys indicate that even greater use will be made of the stronger alloys. As that happens, these stronger parts are sure to become more complex in design, lower in cost.

Already, experimental shapes having a central hub section with arms or spokes of various cross-sectional designs have been produced by a modification of the existing process—lateral extrusion. This technique may well be combined with conventional forward and reverse impact extrusion to produce much more intricate shapes, only dreamed of today.

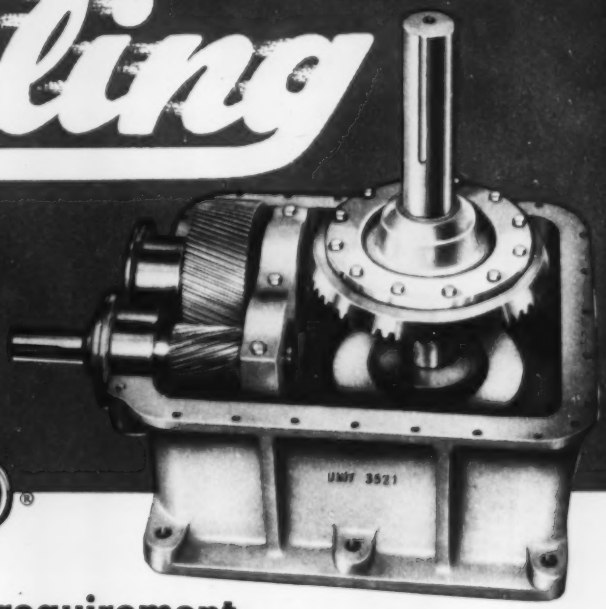
Your next move ... In this small space, it is virtually impossible to cover all phases of the impact extrusion process or illustrate all the possible uses to which it can be put.

Should you have further questions, write on your company letterhead to ALUMINUM COMPANY OF AMERICA, 1991-E, Alcoa Building, Pittsburgh 19, Pennsylvania, for your copy of the new, *Alcoa Impact Fact Book*.

Better still, contact your local Alcoa sales engineer. His office is listed under "Aluminum" in the classified section of your telephone book. Whether you plan to buy aluminum impact extrusions tomorrow, next week, or a year from now, he'll be glad to discuss your production problem with you. That's his job.

3 Cooling TOWER DRIVES

by PHILLIE GEAR®



a type and size for every requirement

The growing use of larger fans in cooling tower service brought the need for a drive that would best meet heavier load conditions. Philadelphia, having long been a leading manufacturer of conventional worm gear cooling tower drives, thoroughly understood this problem and presents a complete line of right angle Speed Reducers . . . Worm Gear, Spiral Bevel, and Helical Spiral Bevel. All three types are specifically manufactured for cooling tower fan drives. Housings are made of high quality close-grained grey iron and are proportioned to withstand the severe stresses encountered during operation. All shafts mounted in anti-friction bearings to assure high efficiency, correct center distance and proper shaft alignment. Bearings provide generous thrust and radial capacity . . . all these features give long, quiet service life.

worm gear

HP range—3 thru 30 HP @ 1750 rpm input.

Ratio range—3⅝ to 8¾.

Efficiency—up to 95% depending on ratio.

Application—Best economy in range up to 25 HP. Quiet operation, suitable for input speeds up to 2000 rpm.

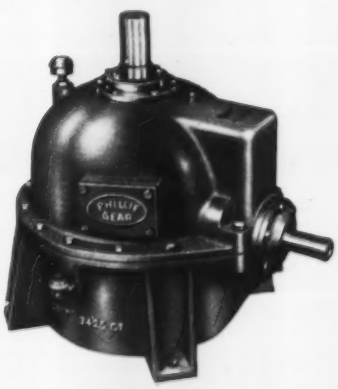
spiral bevel

HP range—15 thru 75 HP @ 1750 rpm input.

Ratio range—3½ to 9⅛:1.

Efficiency—97-98%.

Application—Best economy above 15 HP. Advantages of high efficiency, small heat loss. Suitable for input speeds up to 2500 rpm.



helical spiral bevel

HP range—20 thru 115 HP @ 1750 rpm input.

Ratio range—6⅔ to 15:1.

Efficiency—95-96%.

Application—Best economy when used on drives greater than 25 HP and when required ratios exceed those possible with single reduction spiral bevel. This unit also best suited for turbine applications up to 4000 rpm input.

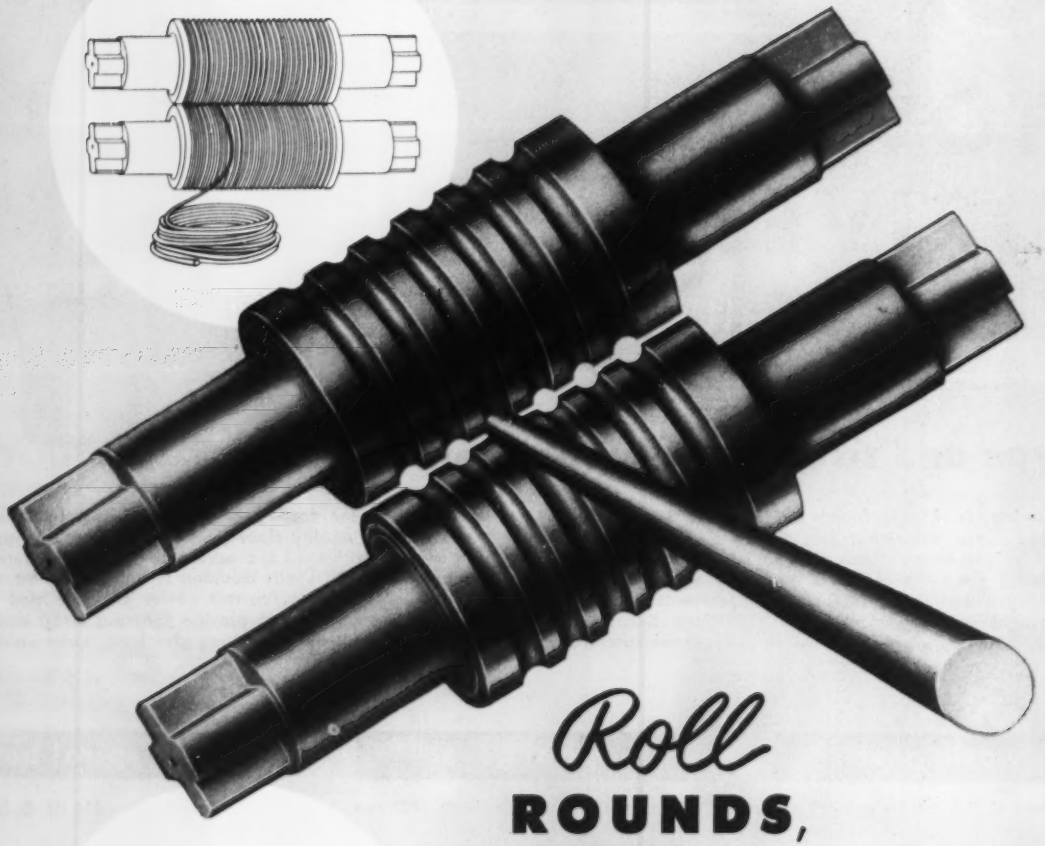
Write for our new catalog CT-53 illustrating all types of Cooling Tower gear drives and their applications.

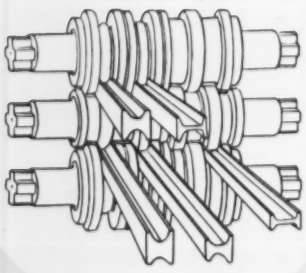
PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

Industrial Gears & Speed Reducers

LimiTorque Valve Controls





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ROUNDS,
RODS and
CHANNELS with

National Rolls

In All Sizes and Metallurgical Composition to meet your Specific Requirements

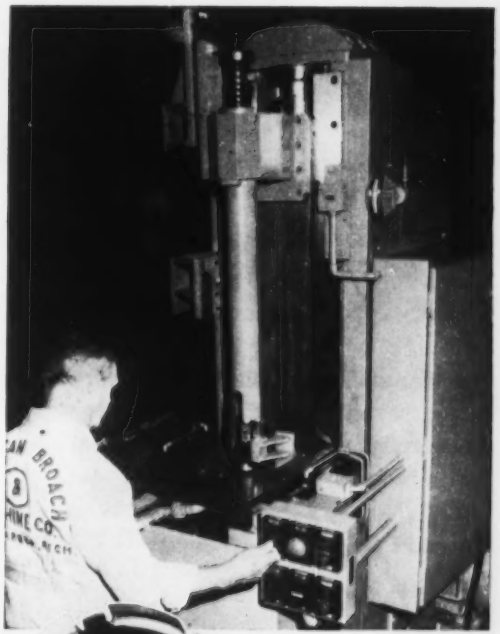
THE NATIONAL ROLL & FOUNDRY CO.

Avonmore, Pennsylvania

SPECIALISTS IN IRON, ALLOY IRON AND STEEL ROLLS AND CASTINGS
STEEL ARMOR CASTINGS

Fixed broaches + automatic cycle } = HIGH PRODUCTION

by broaching the *American* way



PROBLEM To broach six external lugs on a stamped transmission clutch flange part in one pass.
(The previous broaching set-up consisted of three fixed broaches on the machine slide, a receding table and an indexing type fixture. Three lugs were broached in one pass, the table receded, the fixture indexed 180° and the opposite three lugs broached. This did not meet production requirements nor accuracy as the receding table and index fixture allowed too great an accumulation of error.)

SOLUTION A special American 10 ton, 42 inch stroke vertical broaching machine arranged to push the part past six stationary roughing broaches in one pot which nibble and adjustable finishing broaches in the second pot which shave the part. A 3 to 4 times hourly production increase with the part held within the tolerance was the results of this ENGINEERED PRODUCTION broaching operation by American.

OPERATING CYCLE: The operator first loads a part and starts the automatic machine cycle with dual push buttons. The transfer slide moves forward to broaching position and automatically starts the main ram down. Fastened to the ram is a push bar which locates the part and pushes it through the stationary broaches. The part is automatically discharged at the end of the stroke. The automatic transfer slide returns to loading position allowing the operator to reload while the push bar is returning up.

American can give you this Greater Production Economy

This is only one example of how broaching the American-way solved this manufacturer's problems. Because American manufactures a complete line of broaches, broaching machines and fixtures, they can help you engineer your job *completely* to obtain the greatest production economy. Start American working for you by sending a part print or sample and your hourly requirements.

Write for Circular 300 showing American's complete line of hydraulic surface broaching machines.

American BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

SUNDSTRAND

The expert's materials work with him!

Superior skill lies behind the wizardry of the fly rod expert. But, he pays very close attention to the materials from which his rods, reels, lines, and flies are made. He is very exacting in his specification of materials that will provide the precise balances, weights, and flexibility his art requires.

The fly rod expert makes sure that his materials are working *for* him and *with* him.

Add this Spec to Your Blueprints

Memorandum

You can depend upon J&L ELECTRICWELD TUBING . . . it works *for* you and *with* you! It's made from J&L steel of carefully controlled quality.

You can depend upon J&L Electricweld Tubing for:

1. Uniform wall thickness (easy forming)
2. Strength (comparable in strength to heavier sections)
3. Ductility (easier, faster fabrication)
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7. Lower costs (savings in material and overall production costs)

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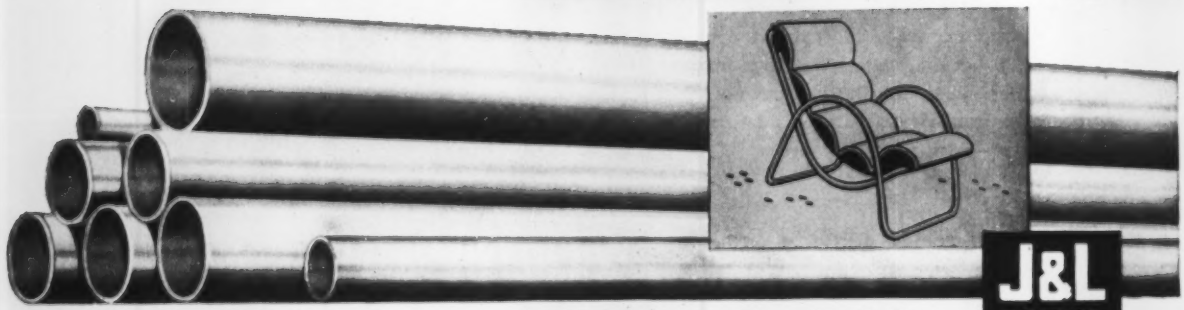

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Fleetwelder AC *with Arc-Booster. 300, 400, 500 amp sizes. For wide range of light and heavy welding with AC.*

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Lincoln's new combination of lower AC machine prices and faster welding with Jetweld heralds another development in Lincoln's program to lower welding costs.

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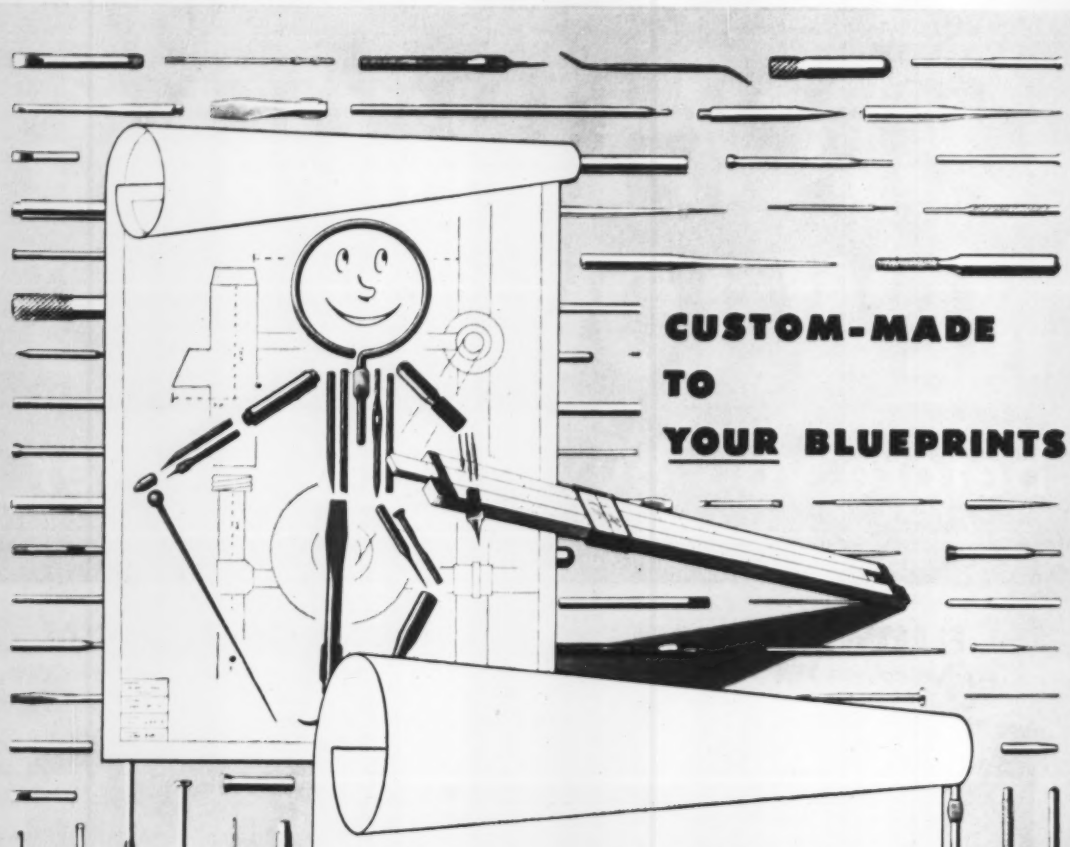

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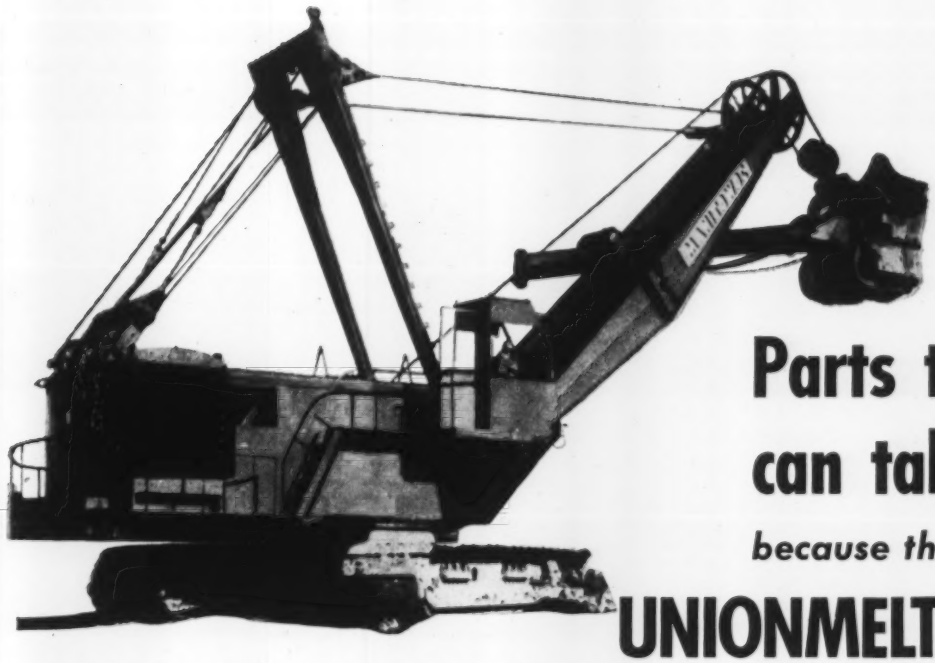

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Dipper sticks have to be strong to absorb severe stresses. That's one reason why the three main sections of this part are UNIONMELT *welded. Sound welds can be made in metal up to 3-in. thick in a single pass.*

A power shovel dipper stick has to be strong. It must withstand severe banging, twisting, and bending stresses as its huge scoop bites out hundreds of tons of earth and rock in each day's operation. But these dipper sticks can take it—they're made by UNIONMELT welding.

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Wheelabrator Airless Blast Cleaning Solves Die Casting Finishing Problems Saves $2000 Monthly For Racine Die Casting Co.

Compare the finish on the surface of the two pieces illustrated above. Note the surface uniformity and the complete absence of flash and burrs on the casting at the bottom, photographed immediately after finishing in an airless Wheelabrator at Racine Die Casting Co.

Not apparent in the pictures, however, are the manifold savings effected in overall finishing operations by this problem-solving mechanical method. Practically all manual punching and filing and trimming operations have been eliminated—at an estimated $2000 monthly saving.

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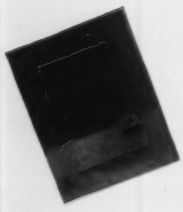
If you are producing die castings, the Wheelabrator can make similar savings for you in your finishing operations. Its advantages are not limited to die casters, however. The Wheelabrator is profitably being used for cleaning or finishing forgings, weldments, castings, heat treated parts, stampings, etc. If the finish is important on your product, investigate what the Wheelabrator can do for you. Write today for details.



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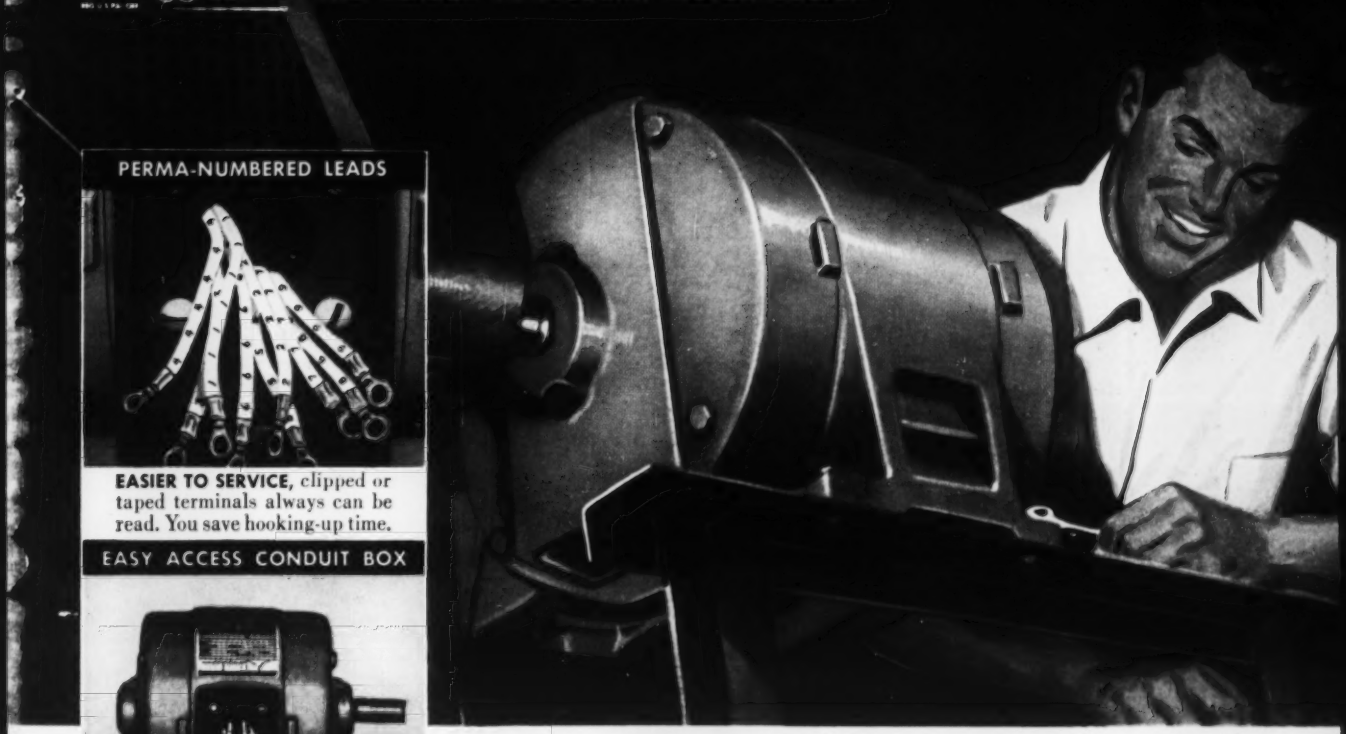

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MORE FULLY PROTECTED motor achieved through redesign of cast iron frame and end shields.

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NEW BEARING SYSTEM means the G-E motor runs longer without relubrication than any other.

Now, easier installation, less maintenance...

G.E.'s new TRI 55 CLAD motor—you can install it and forget it!

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The all-new General Electric Tri/Clad '55' motor is specially engineered to reduce your installation costs . . . and run longer, without attention, than ordinary motors. This new motor gives you 60% more physical protection plus longer electrical life. In addition, a bearing system designed to use the most modern greases means you will not have to regrease the Tri/Clad '55' for years.

You save with the new Tri/Clad '55' because wiring is easier and faster. The large, diagonally split conduit box gives you plenty of knuckle room. Leads are perma-numbered . . . you can always identify them instantly.

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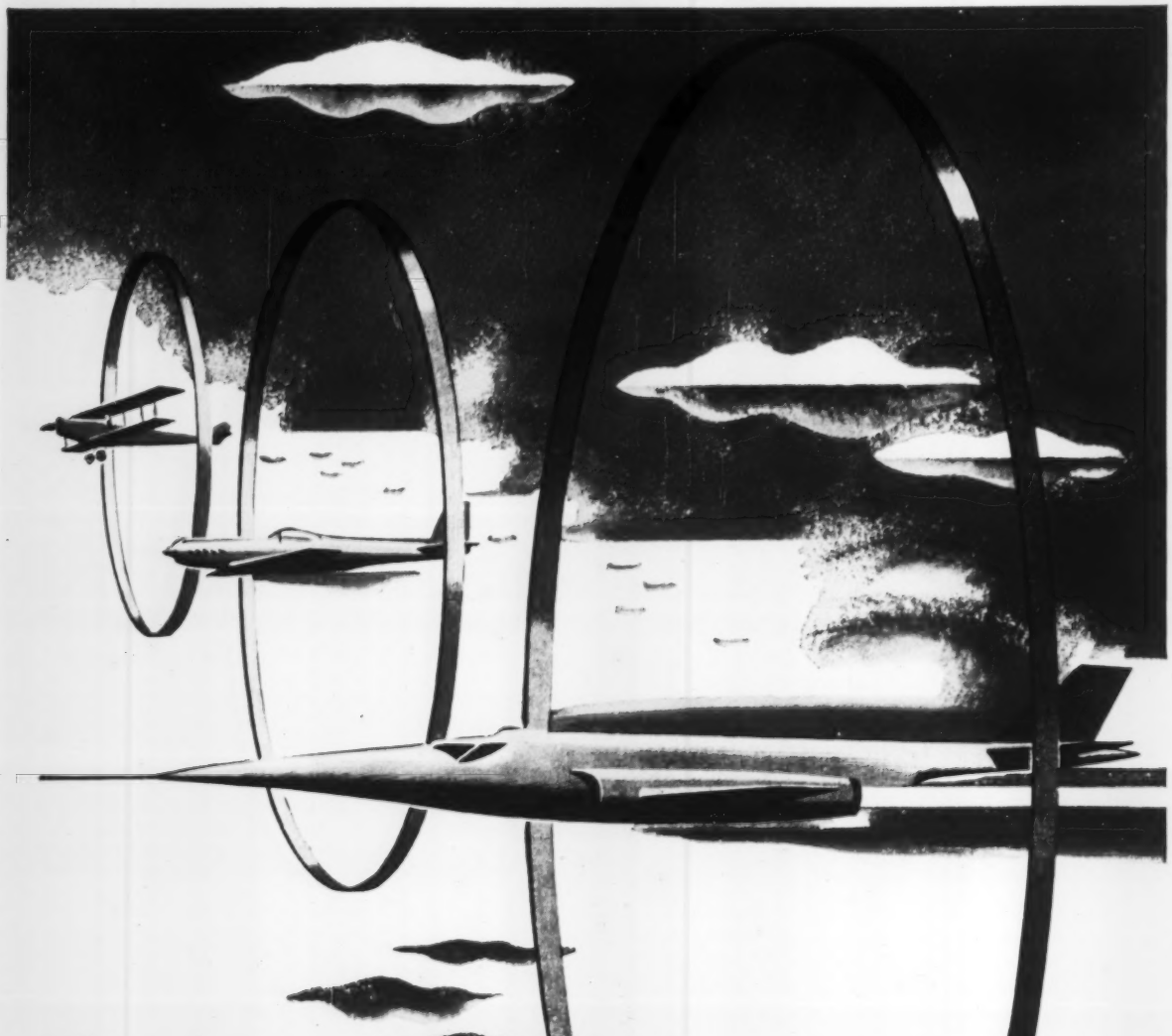

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STEEL
May 10, 1954

Metalworking Outlook

New Basis for Capital Spending?

Competition, more than optimism about the business future, will put this year's capital expenditures at a near-record $27 billion. Henry F. Dever, president of Brown Instrument Division, Minneapolis-Honeywell Regulator Co., told the Instrument Society of America that about 60 per cent of 1954's capital outlay will go for plant improvements. While some of those improvements will mean expanded output, the major purpose is to cut costs and gain a competitive advantage. In 1952 about 51 per cent of total capital expenditures went for modernization. Last year it rose to about 57 per cent, and for the next three years most estimates place it between 60 and 62 per cent.

Packaged Selling

Because of the growth in automation, look for increased impetus to the "complete-package" method of selling equipment. More and more builders will quote on a complete installation of an automated line and subcontract for the items they don't make themselves. It's a practical approach because of the ever-increasing interdependence of all the equipment in a plant.

Automated Selling

Automation will have another effect on selling methods, too. As automation brings more mechanization to the production lines, it will require more mechanization in selling, also, so that the increased output can be marketed. Speaking at a Notre Dame conference on selling, Ross Roy, a Detroit advertising man, said that "for every dollar you spend in plant automation, you've got to set aside money to invest in sales manpower and equipment that will assure full disposition of your output." He advocates setting up a sales budget exactly the way a budget for improved production is established.

Good News in Construction

Sky-high construction continues as the brightest spot on the economic horizon. Expenditures for building in the first four months this year totaled $10.1 billion, about 1.5 per cent more than in the like 1953 months. Major increases, this year compared to last, occurred in construction of stores, offices, schools, churches, highways and sewer and water works.

Titanium: Full Speed Ahead

Government aid will bolster titanium production. Office of Defense Mobilization plans an inventory of 4000 tons of titanium sponge. The purpose is two-fold: To assure aircraft and other military contractors of metal when they need it, and to encourage producers to continue the high output. First contracts went to E. I. du Pont de Nemours & Co. for 1,250,000 pounds and to Titanium Metals Corp. for 600,000 pounds.

Manganese and Butter

American Manganese Producers Association is up in arms at the Foreign Operations Administration's proposal to trade surplus butter for Russian

The Technical Outlook—p. 113 The Market Outlook—p. 177

manganese. Association President Carson Adkerson says that such a move will delay still further the development of a strong domestic mining industry, an essential in case of war. More than 90 per cent of the 2.3 million tons of manganese ore consumed in the U.S. in 1953 was imported. He wants government support to assure that at least one-third of our supplies come from domestic sources and the establishment of an emergency stockpile of at least 10 million tons of ore.

Scrap Men Protest

Many scrap men are unhappy at the decision of the Chicago Mercantile Exchange to establish a scrap iron and steel futures market. The Chicago chapter of the Institute of Scrap Iron & Steel Inc. says, "We feel that such a market would be of no value either to producers or consumers of scrap . . . It would impede the free and orderly flow of scrap from producer to consumer." No. 1 heavy melting—the only grade apparently considered for trade—accounts for only 1.5 to 3 per cent of scrap consumed. The New York Commodity Exchange, scrap men point out, once also considered listing scrap on its futures market, but dropped the idea.

Third Labor Group?

Don't hold your breath until John L. Lewis, Dave Beck and David J. McDonald team up their coal, teamster and steel unions to form a third big labor federation. Mr. Lewis is pushing the idea the strongest, and Messrs. Beck and McDonald are dissatisfied enough with their present affiliations to listen. But they both also have a lot to lose in pulling out of the AFL and CIO. Odds are strongly against their making such a move. But they do enjoy the talk for they think it provides ammunition for Mr. Beck's cold war with AFL president George Meany and Mr. McDonald's struggle for power with CIO President Walter Reuther.

Straws in the Wind

Interstate Commerce Commission will hear argument June 28 on questions involved in the movement of highway trailers by rail . . . United Steelworkers of America has asked for a National Labor Relations Board election to determine whether it or the independent union now certified will represent the 10,000 Weirton Steel Co. employees; USA has tried unsuccessfully for years to organize Weirton, the last time in 1950 . . . Commerce Clearing House estimates that $112 billion has been put away by private industry for employee retirement . . . Technological improvements have enabled U.S. Steel Corp. to lower some stainless steel sheet prices; a few prices have been raised on products made on hand mills.

This Week in Metalworking

Steel labor talks begin May 18 when U.S. Steel Corp. and the union get together (p. 71) . . . Steel warehousemen foresee a business pickup by this summer (p. 72) . . . Look for improved service from railroads as they try to regain more steel business (p. 73) . . . Metalworking earnings for the first quarter show up surprisingly well (p. 74) . . . Metalworking business increases as a result of LP-gas expansion (p. 75) . . . The administration has submitted to Congress a $400-million shipbuilding plan (p. 77) . . . Industrial rubber goods sales in 1954 will be off 10-20 per cent, but volume still will be good (p. 83).

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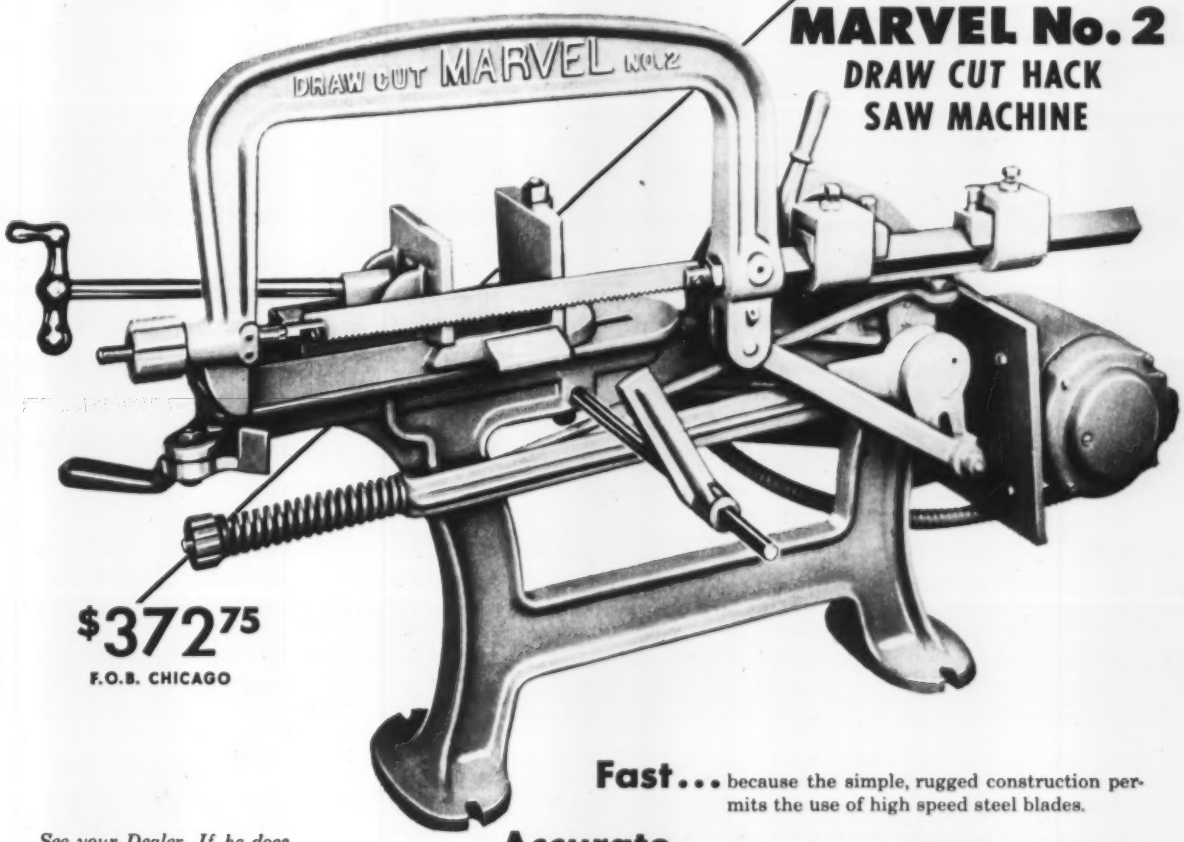

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- using the same grade of steel but avoiding restrictive "extras" that add nothing to the performance of the stamping
- switching from Commercial-or-better Quality to ***ECON-O-GRADE,*** especially for not-so-complicated, plainer finished stampings
- switching to a costlier grade as from a sheet product to ***STRIP*** for greater uniformity, better finish, more efficient workability.

There is no magic in either practice. On your part it's ***VALUE ANALYSIS;*** on ours, ***JOB-FITTING.*** Simply stated—it's a case of "value buying" and "value selling" versus requisition-filling and order-taking.

Let's get together and talk over the possibilities. You won't obligate yourself the least bit.

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Criticism from the Left

Last Wednesday a few socialistic-minded persons attending the National Democratic Conference in Washington took occasion to criticize certain policies of the Eisenhower administration. Some of the more outspoken of the critics charged the present administration with deliberately following what they term is a "blueprint of recession."

They also complained about many other things President Eisenhower has done or attempted to do during his brief period in office. In their opinion, every effort he has made to reduce government expenditures, to restore the purchasing power of the dollar, to get the federal government out of competition with private business and to give the individual an opportunity for greater control of how he shall spend his own money is wrong. If they were to have their way again, they would resume reckless spending and deficit financing, increase the size of government and reinstate bureaucratic controls.

These critics of the present administration accuse the President of ignoring the "depression" and of refusing to do as much as they think should be done to combat it. They declare that the situation is so bad that the government should be doing some of the things that were done in the middle thirties.

To most sensible persons this pessimistic and impractical attitude is wrong on three counts. First, unemployment is not as bad today as it was in 1949 and 1950, and these socialistic critics at that time did not accuse President Truman of ignoring a depression. Secondly, in reducing the Truman budget and in reducing taxes the Eisenhower administration and Congress have done more in this direction than ever has been done before.

Thirdly, the antidepression measures which the socialistic-minded politicians advocate were given a thorough trial in the great depression of the thirties, and they were a complete failure. Unemployment actually increased during practically all of the time they were on trial.

From the attitude of these critics and the slant of the writings of some New Deal columnists, it is clear that the force of destructive socialism still is strong throughout our land.

E. C. Shaner

EDITOR-IN-CHIEF

LEVELING THE CYCLE: Herbert L. Tigges, executive vice president of Baker Brothers Inc. and also president of the National Machine Tool Builders' Association, voiced firm confidence in the future of the machine tool industry at the association's spring meeting in Chicago last week. He believes that the circumstances existing in the present transitional

period (p. 76) provide a unique opportunity for long-range stability in the industry.

Mr. Tigges cites these factors as having an important influence upon the outlook for machine tool builders: Continuing high level of industrial production, great accumulated obsolescence in the nation's equipment, intensified cost-consciousness among machine tool users, continued national defense requirements and a more understanding attitude on the part of the federal government.

This combination of favorable influences, he believes, has the potential of helping machine tool builders to level out the so-called machine tool cycle, which historically has been the industry's No. 1 headache.

* * *

CURBING OBSOLESCENCE: Of course, the problem of the economic cycle is not a headache reserved exclusively for machine tool builders. It has plagued all branches of the metalworking industry for many years. If there is anything new in the present industrial situation which will tend to iron out the ups and downs of the economic cycle, it will be welcomed with enthusiasm by every responsible industrial executive.

We believe that many thoughtful persons will agree that there is a relatively new element in the situation. For want of a better descriptive term, one might call it the awareness of industrial management of the curse of obsolescence in productive equipment. Today sharply accentuated forces of competition are causing industrial executives to make a new inventory of manufacturing facilities. The result of this inventory must be inevitably a fresh appreciation of the advantages of machines which measure up to current standards of productivity.

* * *

A MOVE FOR SECURITY: One of the distasteful but highly important problems of a company that has a contract with Uncle Sam to turn out goods for the defense program is that of security. Assume that you apply to the government for a contract to supply certain goods or services. At the very outset of negotiations, there arises the question of how much latitude may be given to the publication of the specifications of the item the government wishes to buy. Of even greater concern is the extent to which subcontractors may be entitled to information that is divulged to prime contractors.

The government has issued a bulletin that may be helpful to defense contractors. It is entitled "Industrial Security Manual for Safeguarding Classified Information, DD-441." It can be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, for 15 cents.

* * *

MONTH OF CONVENTIONS: This is one of the times of the year when the men and women of metalworking companies who are directly concerned with the conventions and expositions which cater to their problems or interests are subjected to terrific punishment. In the spring, from April to June, there are hundreds of industrial conventions and dozens of shows. From September through October there are also many of these events. But if we are to designate any one month as tops in the convention schedule, it must be May.

That is the month in which most of the metalworking associations hold their annual meetings. American Steel Warehouse Association (p. 72) held its annual meeting last week. The record-breaking conference and show of the American Foundrymen's Society in Cleveland started last Saturday. The Basic Materials Exposition (p. 122) will hold forth in the International Amphitheatre in Chicago from May 17 to May 20.

* * *

NEW SLANTS ON PROFIT: A study of earnings of typical metalworking establishments for the first quarter reveals results that are difficult to evaluate. In last week's issue, the editors presented figures on the profits of representative steel producers. In most instances, profits for the first quarter of 1954 were below those of the first quarter of 1953.

In the case of 50 metalworking companies, not including steel producers (p. 74), first-quarter net profit reports are rather encouraging. Half of the reporting companies show an increase in net in 1954 over that of 1953. The improvement in net profit was particularly noticeable in the case of aircraft manufacturers. Also there was a hint that the more intricate the manufacturing operation, the greater was the percentage of profit to sales volume. It might be that a study of profit in relation to the degree of refinement in production operations would reveal significant factors.

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You draw on stocks of more than twenty different kinds of sheet steel at Ryerson—hot rolled, pickled and oiled, cold rolled, galvanized, deep drawing and many others. And ton upon ton of coil stock in many gauges are also on hand. To transform these stocks into blanks, straight lengths, coils, etc., efficient Ryerson shearing, slitting and edging equipment and cut-to-length lines, which turn coil steel into flat sheets of any measure are all at your service.

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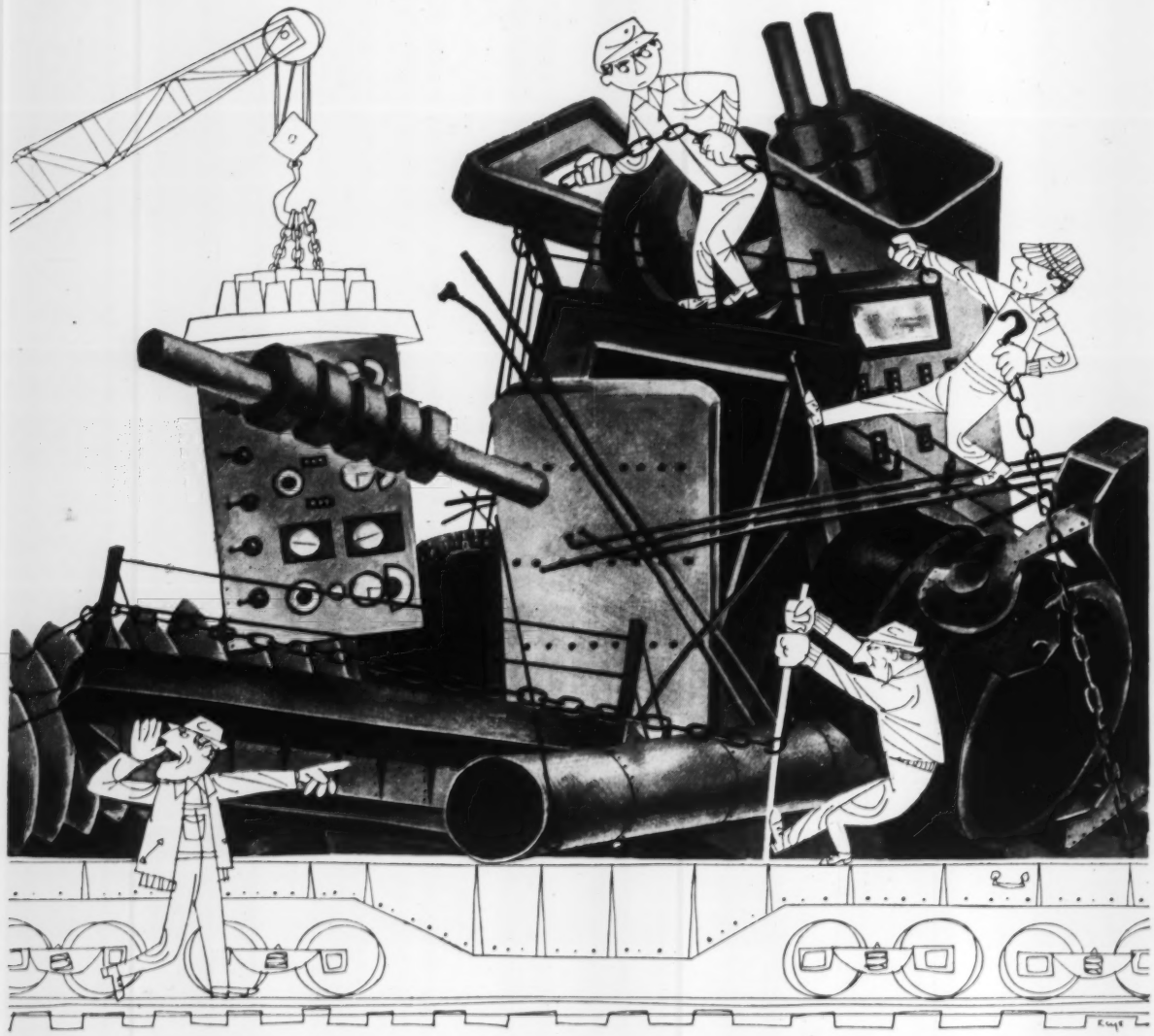

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Kaiser Steel Corp.

Steel Talks Set Pattern in Labor

The parleys that begin next week will eventually result in an agreement that will set the contract settlement tone for the year. Look for higher pensions, no GAW

THE MOST IMPORTANT labor negotiations of 1954 will begin May 18.

Contract talks of serious import are already under way in the electrical and rubber industries, but pattern-setting parleys begin next week in Pittsburgh when the United Steelworkers of America-CIO and U. S. Steel Corp. get together to negotiate a new wage contract.

Publicity—Getting the most attention will be the demand for the guaranteed annual wage, or supplementary unemployment compensation, as Steelworker President David J. McDonald prefers to call it (STEEL, Apr. 5, p. 60). The union's Wage Policy Committee, which met last week to draft its formal list of demands, named the GAW as a major need.

Their proposal will call for a contribution by employers to a trust fund out of which unemployment benefits, supplementary to state benefits, would be paid. Employers' liability would be limited to the amount in the fund. A proposal submitted to Aluminum Co. of America last year calls for a 10-cent-an-hour contribution by employers, integration with federal-state unemployment compensation to raise average benefits from the present 33 per cent of wages to slightly above 60 per cent.

Industry's Stand—The steel industry generally is against that plan. As one executive told STEEL, "There will be a terrible strike—and I mean terrible—if the union really insists on GAW." But steel officials also think the chances of a strike are remote. Bethlehem Steel Co. Chairman Eugene C. Grace says, "The chances are against a strike because there's no justification or reason for one." Republic Steel Corp.'s assistant president, T. F. Patton, says, "I don't believe there's a chance in the world of having a steel strike this year." He and others regard Mr. McDonald as a diplomat in labor who will be reasonable in negotiations.

Many labor observers point out that GAW has been on the union's agenda since 1943, but never before seriously pressed. It will be pressed publicly this year, they concede, but not privately in negotiations.

The Settlement — Then, what will management and labor finally settle for? The GAW will probably be by-passed by the formation of a joint-management committee to study the matter for a year. Management will be sympathetic to the union demand for higher pension payments, and the present benefits of $100 a month may be boosted to $137.50,

the same as the autoworkers won last year. Management may also agree to an improved insurance program.

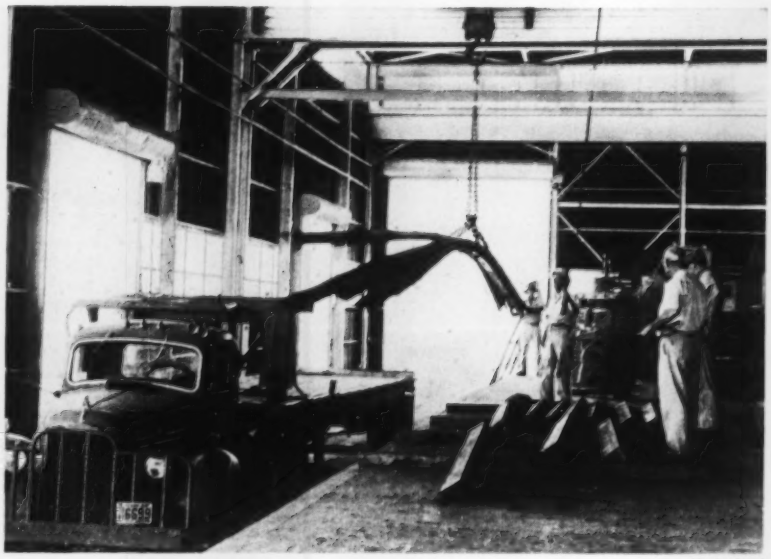
But the industry will balk at outright pay hikes and at many of the fringe demands, notably the request for overtime pay on Saturday and Sunday as such. Because the whole contract is subject to reopening this year, much time will be spent in the coming negotiations on the wording in some sections, especially those pertaining to management's rights.

The Status—The steel contract settlement is important because it comes in such a basic industry. Many USA contracts with companies other than basic steel producers are deliberately patterned after the major settlement. Some small firms that don't have contracts with USA have a tacit agreement with their union to go along with many of the major provisions of the steel contract.

While the big electrical and rubber agreements will probably be made before the steel contract is signed, the nature of those settlements will be influenced by the course of the steel parleys which will be going on before the final electrical and rubber decisions need to be made.

A Quiet Time?—All signs point to a reasonably peaceful labor year in 1954. The business decline and unemployment of some 4 million weaken the unions' bargaining position. In the first quarter this year there were only 800 work stoppages in effect, involving 300,000 workers for 3.1 million man-days of idleness. In contrast, the 1276 stoppages in the first quarter of 1953 accounted for 3.7 million man-days of idleness involving 550,000 workers.

But labor will make some gains this year. Pay hikes may average 5-7 cents per hour in 1954, plus about 1 cent per hour more in average payroll costs resulting from new or additional fringe benefits. A survey by Associated Industries of Cleveland indicates that the average company already has fringe benefit obligations which cost it 30.8 cents per hour per man, up 6 cents from 1951.



U. S. Steel

Warehousing: A Late Summer Upturn?

FULL INVENTORIES, curtailed demand—these present warehouse operators with one of the toughest marketing situations they've had in years.

In sharp contrast to a year ago, this climate provided the major emphasis for both corridor talk and session topics at the 45th annual convention of the American Steel Warehouse Association in Chicago.

The Contrast — Current volume for some operators is off 40 to 50 per cent, but the total is still well above prewar years. Outlook for the remainder of the year is for an upturn in volume toward the end of summer. Most distributors compare the current situation with that of 1949 and believe that inventories are pretty well worked off; reflecting this is the increase of small, prompt-shipment orders.

Normal Patterns—With the reappearance of normal marketing patterns, warehouses are expected to lose most of the quantity orders they got in the boom years. However, the importance of the warehouse function remains in handling small, prompt-shipment orders too expensive for the mills to handle. Last year warehouses handled 18.9 per cent of the steel produced.

Here's the outlook:

Structural Shapes — Relatively high demand continues for highways, bridges, commercial building, schools, public structures. Stimulating demand for light sections is the architectural trend toward one-story buildings.

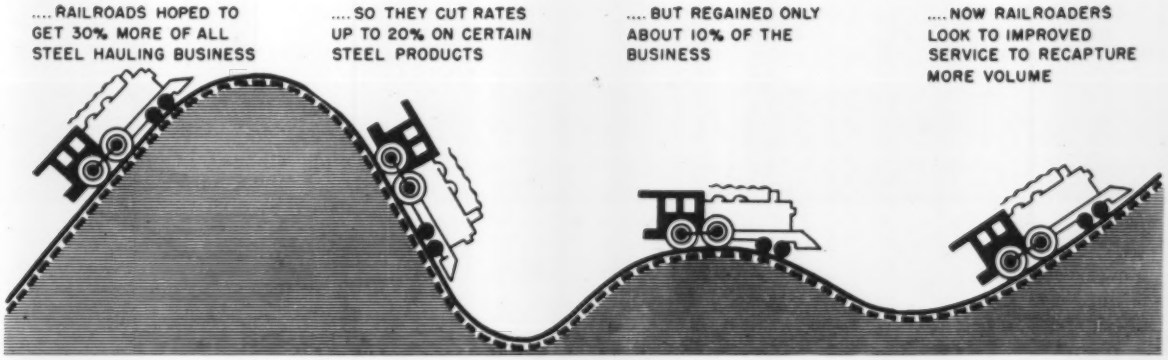
Plates—Shipments to carbuilders, shipbuilders and pipeline interests are off. However, first and second-quarter demand has improved markedly over the last nine months of 1953. Some consumers still hold substantial inventories, but a rising demand is seen in the third quarter.

Cold-Finished Bars—Here it's a one-word picture: Oversupply. It was suggested that warehousemen get behind a movement to reduce the number of sizes and grades that mills are asked to produce.

Sheet and Strip—Consumption is currently out-running buying and inventories are shrinking. Auto and appliance requirements are down, but general manufacturing demand remains at a high level.

Alloys—Demand is down from the boom years, but it's considered at a comfortable level for a "normal" year.

Attendance at the convention exceeded 500. Officers for the coming year include: Walter S. Doxsey, re-elected president; F. H. Lovejoy, Wheelock, Lovejoy & Co., Cambridge, Mass., re-elected chairman of the executive committee; C. L. Hardy, Joseph T. Ryerson & Son, Chicago, and Earle M. Jorgensen, Earle M. Jorgensen Co., Los Angeles, vice presidents.


....RAILROADS HOPED TO GET 30% MORE OF ALL STEEL HAULING BUSINESS
....SO THEY CUT RATES UP TO 20% ON CERTAIN STEEL PRODUCTS
....BUT REGAINED ONLY ABOUT 10% OF THE BUSINESS
....NOW RAILROADERS LOOK TO IMPROVED SERVICE TO RECAPTURE MORE VOLUME

Steel Users Gain as Railroads Pull for More Steel Traffic

RAIL RATE REDUCTIONS on certain steel products (see STEEL, Mar. 22, p. 39) have set off a chain reaction which will continue to benefit steel users in the months ahead.

General rate increases being considered by many trucking concerns have been postponed indefinitely, and some steel users report "special combination shipment" offers from truckers "so that we can cut our costs."

More Reverberations — The reduced rail rates also have forced some steel mills to lower their base prices in certain localities to bring their local delivered prices into line with steel shipments from more remote mills. And the steel product rate reductions are not the last to be made by the railroads. Talk persists of coal and coke rate reductions in some areas.

Finally, from 5 to 10 per cent of the traffic on steel products in the Official Territory (bounded generally by the Mississippi river, Ohio river and Atlantic ocean), where the rate reduction occurred, has shifted from motor carriers to rail carriers. And chances are good that more diversion will occur later in the year. On these shipments, steel users are saving up to 20 per cent on freight costs.

Not Utopia—On the whole, however, early diversion of steel traffic has been disappointing to railroad interests. The rate reductions made in March amounted to approximately 15 per cent of the railroads' revenue on total steel traffic at the time of the rate change. At best the rails have regained but 10 per cent of steel traffic (they were shooting for 25 to 30 per cent more of total steel haulage), increasing their share of total steel haulage from 45 per cent to about 55 per cent. Only one railroad's executive could boast at a recent meeting that thus far the rise in steel traffic had more than offset the reduction in rates.

Railroaders realize that the shift from rail to truck shipments did not occur overnight, and the return to more rail shipments won't happen that way either. It will take time and re-education for these steel handling firms to revamp facilities and production schedules to handle more rail shipments.

One Reason—A prime reason for the slow diversion to rail shipments is that manufacturers are keeping inventories low for business reasons and need quick and certain steel deliveries to meet their commitments. Manufacturers have grown accustomed to prompt delivery service.

Another factor directly affecting diversion is the delivered cost of steel. Flat-rolled steel products, shipped in open freight cars, must be shrouded and/or strapped. That additional expense militates against any savings made possible by rate reductions. On hot-rolled steel products, such as bars, no such protection is usually needed and the chances for savings are greater. Diversion has occurred more on the latter products, of course.

Changes Ahead?—While the inventory positions of many manufacturers dictate speedy truck shipments currently, there's reason to believe that situation may change. Said one manufacturer's traffic manager: "These rail rates are very nice if you can adjust your production schedules to take advantage of them. We're considering it, but the shift will take a little time." An eastern Pennsylvania manufacturer said: "Business is slow for us now which means smaller incoming steel orders involving truck quantities. Once business picks up we'll certainly make an effort to bring in a greater amount by rail because savings under new rail rate schedules are appreciable."

One Cleveland manufacturer commented: "We've upped rail shipments from 5 per cent of incoming orders to 25 per cent and it may go as high as another 40 per cent. But the railroads will have to do something about service first." The railroads are making efforts to improve service, too. a STEEL survey shows that many big shippers have been contacted by the railroads for suggestions on how to improve service.

So the spiral of benefits to steel users continues. In the meantime, these steel users are saving money on such rail shipments as do come in.

Piggy-backs for Pennsy

Pennsylvania Railroad plans to begin piggy-back service—hauling truck trailers on flat cars—about June 16 with loaded trailers being handled on fast freight trains serving New York, Philadelphia, Pittsburgh and Chicago.

Earnings: A Good Start for 1954

Profits so far compare favorably with last year, even though sales are down. Chief factors involved: Absence of excess profits tax, closer management

PROFITWISE, business for metalworking during the first quarter, 1954, can be termed good.

Few records were chalked up, but compared with 1953 most companies' first-quarter reports show up favorably—a few suffer considerable declines, a few display hefty gains.

Balance—Numerically, the accompanying table splits about even between those having gains and those with declines. Steelmakers, whose profits for the period were generally down (see STEEL, May 3, p. 58), are not included.

Biggest strength for the period was recorded by the aircraft industry. Electrical instruments and business machine producers gained as did two of the three listed containermakers. The nonferrous metalworkers varied widely and the foundries generally limped through the period.

The Strength—The high-flying profits of the aircraft industry reflect the government's increasing emphasis on air power in the defense program. The four companies listed show an 88-per-cent gain; Boeing Airplane Co. and Douglas Aircraft Corp. both more than doubled earnings this year over last.

But metalworking's plus factors for profits, even though sales were generally down between 5 and 10 per cent, were the absence of excess profits tax and high-cost, near-capacity operations. Executives are paying closer attention to overtime, purchasing policies and other operations. For some, diversification has brightened the company balance sheets.

Continued Pace—Current operations, with more and more upturn signals being noted, indicate that profits for the second quarter may parallel those of the first period.

Bethlehem Ups Building Plans

Bethlehem Steel Co. expects to get four new major projects—costing between $4 million and $5 million each — under way this year in addition to a $97.5-million expansion program already authorized, according to Eugene G. Grace, chairman.

Plans call for a new continuous galvanizing line at Sparrows Point, Md., a fabricating plant at Los Angeles, an additional battery of coke ovens at Steelton, Pa., and a new rod mill at Johnstown, Pa. In addition is a $5-million program for increasing fresh water supply at Sparrows Point.

Mr. Grace estimated that Bethlehem's current ingot capacity of 18.5 million tons would probably be close to 20 million by year end.

Bethlehem's finished steel shipments in the first quarter were 2,737,000 tons. Orders on hand at the end of the quarter totaled $515 million of which $148 million was for ship work.

New Highs for Wirebounds

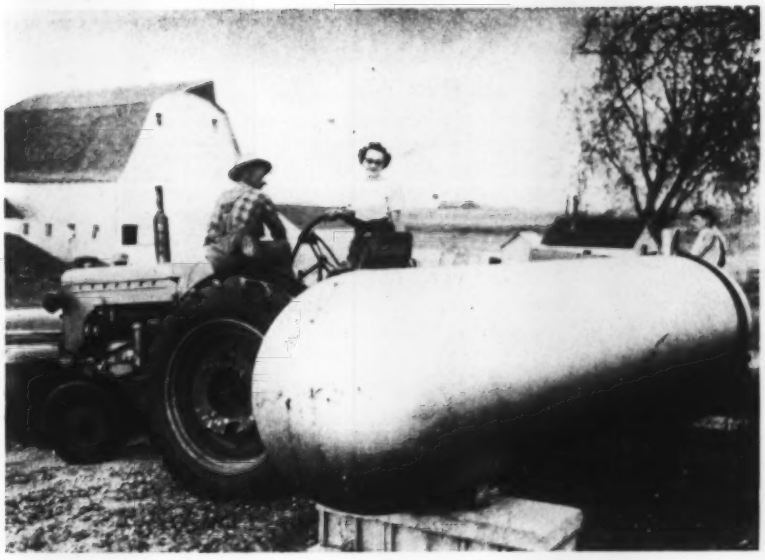
The wirebound shipping container industry set new records in 1953 for both dollar sales and number of containers produced.

Wirebound Box Manufacturers Association figures reveal the industry's dollar volume was $111,260,363—up 3.3 per cent over 1952—and production was 186,367,262 units—up 6.6 per cent. A slump in early 1954 is expected to recede.

First-Quarter Profits Comparison for 50 Firms

	1954	1953
Magma Copper Co.	$ 1,620,187	$ 1,070,513
Reynolds Metals Co.	4,353,734	4,636,263
Thompson Products Inc.	3,268,541	2,806,510
Eaton Mfg. Co.	2,597,433	2,799,470
Mullins Mfg. Corp.	365,015	1,030,221
Container Corp. of America	4,255,000	2,429,000
General Bronze Corp.	221,249	217,942
New York Air Brake Co.	586,415	531,276
General Motors Corp.	189,167,333	151,261,876
Marion Power Shovel Co.	228,674	395,243
Boeing Airplane Co.	8,378,442	3,467,845
Bohn Aluminum & Brass Corp.	289,057	363,866
General Precision Equipment Corp.	1,055,659	664,910
American Brake Shoe Co.	1,665,450	1,295,545
American Can Co.	5,132,607	6,403,865
Clark Equipment Co.	1,243,687	1,427,917
Continental Can Co. Inc.	3,000,317	2,477,446
Remington Rand Inc.	3,740,614	2,744,266
Weston Electrical Instrument Corp.	350,788	255,989
Allis-Chalmers Mfg. Co.	5,598,663	4,804,493
Borg-Warner Corp.	5,001,506	6,340,112
Zenith Radio Corp.	827,521	2,109,461
Aluminum Co. of America	8,372,105	13,257,756
American Machine & Metals Inc.	386,076	350,532
Bridgeport Brass Co.	1,328,556	1,231,464
Revere Copper & Brass Inc.	2,321,134	2,163,079
Standard Forgings Corp.	$ 103,866	$ 290,605
Baldwin-Lima-Hamilton Corp.	1,356,361	1,853,006
Fairchild Camera & Instrument Corp.	376,386	147,147
Firth Sterling Inc.	100,600	221,800
U. S. Pipe & Foundry Co.	1,920,051	1,593,143
Douglas Aircraft Co. Inc.*	8,899,596	4,389,787
Sylvania Electric Products Inc.	2,121,487	2,773,243
Republic Aviation Corp.	924,905	1,901,870
Transue & Williams Steel Forging Corp.	42,384	154,026
Buffalo Forge Co.*	306,790	423,011
Pittsburgh Screw & Bolt Corp.	220,850	358,178
Signode Steel Strapping Co.	494,358	394,330
American Steel Foundries†	2,471,161	3,243,044
Central Foundry Co.	119,039	95,656
Int'l. Business Machines Corp.	10,134,429	7,520,105
Minn.-Honeywell Regulator Co.	3,950,339	2,332,770
Pittsburgh Forgings Co.	479,703	526,395
Rheem Mfg. Co.	1,426,506	1,575,470
Thew Shovel Co.	51,095	554,917
Bell Aircraft Corp.	1,699,069	866,692
National Cash Register Co.	2,458,623	2,305,688
Scovill Mfg. Co.	867,234	1,077,618
Sunbeam Corp.	1,265,756	1,770,403
Bullard Co.	2,264,817	822,496

* Quarter ended Feb. 28. † 6 months ending Mar. 31.



LP-Gas: Plus Factors for Sales Remain

LP-GAS producers are looking to the construction boom and development of new uses to help them fire up another record sales year in 1954.

Sales last year (see table) were 443 million gallons above 1952; prospects for topping the 5-billion-gallon mark this year are good. Emphasis at the May 9-12 meeting of Liquefied Petroleum Gas Association Inc. in Chicago will be on filling in the normal summer load valley to offset the seasonal decline from winter heating.

LP-Gas Sales
(millions of gallons)

1953*	4,920
1952	4,477
1951	4,227
1950	3,482
1949	2,836

*Estimated.
Source: Bureau of Mines.

Domestic Gains—New construction in rural and other areas where natural gas facilities have not been installed is providing the biggest impetus to LP-gas sales. Domestic uses in addition to heating which are showing gains are for ranges, water heaters, refrigerators, driers and incinerators.

Sales last year, according to the association, broke down like this: Domestic and motor fuel, 2.9 billion gallons; industrial, 326 million; chemical manufacture, 1 billion; gas manufacture for utility use, 247 million; and rubber components manufacture, 399 million gallons.

For Motor Fuel—Labeled as the surprising development of 1953 was the introduction of LP-gas as a fuel for industrial tractor and lift trucks. Advantages claimed are lower operating and maintenance costs, reduced engine wear, greater power and freedom from objectionable exhaust fumes. The number of trucks, busses and stationary engines using the gas also rose in 1953 to an estimated 66,000 units. A spokesman for the Chicago Transit Authority predicts that the 500 propane busses now in operation will increase to nearly 900.

One expansion in the agricultural market is in the use of LP-gas tractors, now estimated at 160,000 units. Flame weeding and putting nitrogen into soil by injecting anhydrous ammonia are other LP-gas developments currently being tested.

Storage Capacity Boosted—One of the problems of the industry has been storage facilities. With 67 underground installations now completed, another 76 are being contemplated to boost storage capacity to about 490 million gallons.

Markets for You—Brightness in the outlook for LP-gas producers should spark enthusiasm in metalworkers supplying that market. Valves, fittings and other products for LP-gas production, transportation and storage, and appliances should see a sales increase.

U.S. Buys Critical Materials

Quantities of domestic tungsten, manganese, chrome, mica, beryl, asbestos and columbium-tantalum purchased by the government to stimulate search for and production of strategic and critical materials were announced by General Services Administration.

Amounts authorized for purchase and quantities delivered through Mar. 31 are: Tungsten, 3 million short ton units (20 pounds each) of contained tungsten authorized, 781,733 delivered; manganese, 31 million long ton units (22.4 pounds) contained manganese authorized, 5.4 million delivered; chrome, 200,000 long tons authorized, 53,008 delivered; mica, 25,000 short tons authorized, 3,026 delivered; beryl, 1,500 short tons authorized, 170 delivered; asbestos, 1500 short tons of crude No. 1 and/or No. 2 authorized, 295 delivered; columbium - tantalum, 15 million pounds authorized, 3.9 million pounds delivered.

AEC Awards Contracts

The Atomic Energy Commission awarded 36 unclassified physical research contracts to universities, private research institutions and industrial laboratories. Six are new and the remainder were renewals of standing contracts.

Included in the group were contracts to University of Illinois for studies on mechanism of substitutional diffusion in metals, and annealing of cold worked metals; to Massachusetts Institute of Technology for studies on thermodynamics of metallic solutions, solid solutions and grain boundaries, and fundamentals of cold work and recrystallization; and to Rensselaer Polytechnic Institute for studies on anisotropic diffusion in metals.

The Dip Is Over

That's the opinion of Tool Builder Tigges who sees a chance to end machine tool cycles

TODAY'S circumstances provide a unique opportunity for long-term stabilization of the machine tool industry. That's what Herbert L. Tigges, president, National Machine Tool Builders' Association, and executive vice president, Baker Brothers Inc., Toledo, said last week in his opening address at the spring meeting of the association in Chicago.

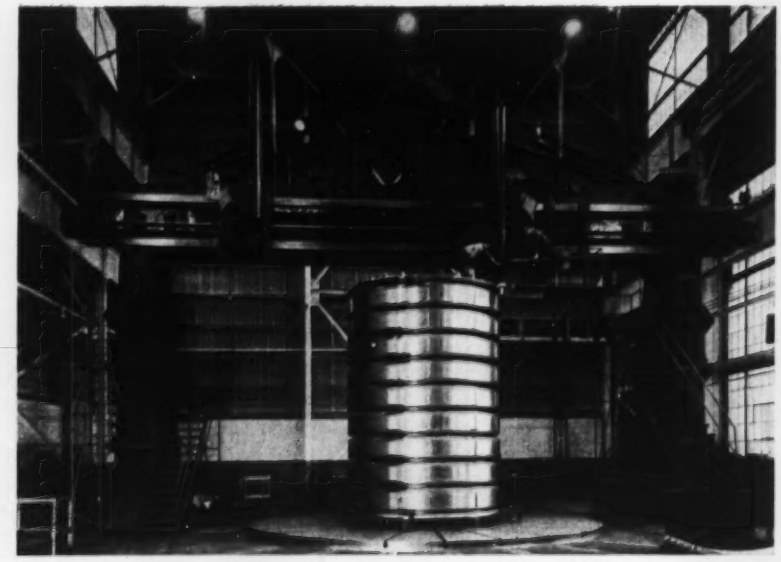
Commenting on the depression "we were supposed to be having," Mr. Tigges said, "It just hasn't come off."

The Switch—"The fact is," he continued, "the country has been passing through a transition period from war to peace, from abnormal to normal demand, from controls to competition, from a seller's to a buyer's market—and in that process, a good healthy shakedown has taken place.

"We are emerging from that phase, right now. I think that throughout our whole economy, we are going to keep right on doing a very large volume of business. Our problem is how to fit our own futures into that picture."

Plus Factors — A combination of factors exist today which, Mr. Tigges feels, will help machine tool builders level out the historically rugged machine tool cycle. They are: Continuing high level of industrial production throughout the country, great accumulated obsolescence in the nation's equipment, intensified cost-consciousness among machine tool buyers, continuous national defense requirements and a more understanding government attitude.

Big Market — The industry's main sales opportunity, Mr. Tigges believes, lies in the replacement market inside the U. S. "We know the extent of obsolescence that obtains today in the nation's metalworking plants. We know that we have the products to overcome that obsolescence and increase, by an incredible total, the productivity of the U. S. However, we must speed up our own rate of redesign to meet the new rapid pace of redesign of product."



For Supersonic Wind Tunnel: A 150-ton Rotor Assembly

Total net runout of this 150-ton rotor assembly for supersonic wind tunnel was held within .002 in. at S. Morgan Smith Co., York, Pa. Rotor assembly is part of 100,000-hp air compressor being built for Lewis Flight Propulsion Laboratory, Cleveland. Similar 150,000-hp compressor is also being built at the York plant

AMA Takes a Look at Equipment Replacement Policies

DO EMPLOYEES and unions view the need for cost reduction in the same light that management does?

That question was raised last week by Herbert E. White, president and general manager, Cleveland Hardware & Forging Co., Cleveland, at American Management Association special conference on capital equipment replacement in New York.

Groundwork—"There is no sure-fire way of getting all employees to accept new machines," said Mr. White, "but there are two steps that can increase the chances: 1. Present your proposition so the employee can understand it, demonstrate your point with specific, pertinent examples; 2. establish some connection between your proposition and the employee's self-interest."

In selling his own company's machine replacement program to employees, Mr. White said, the first step was to acquaint them with basic economics of business. The second was to take up the company's specific problems.

Renting — Leasing (see STEEL, Mar. 29, p. 67, Apr. 5, p. 67, Apr. 12, p. 50) was reviewed by Frederick J. Muth, assistant controller, Armstrong Cork Co., Lancaster, Pa. After discussing the growth of plant leasing, he said that "the leasing of equipment is limited to standard machines that are in general demand and can be rerented quickly." But, he said, the number of companies leasing equipment is also increasing.

"Leasing equipment," he points out, "releases capital needed for inventories and accounts receivable. It assures the low costs possible with up-to-date equipment . . . and it provides a feasible way of acquiring machines needed for short periods only."

Tax Attack — The Internal Revenue Code now going through Congress came under attack by J. H. Landeman, tax lawyer and professor of law at New York Law School. He told the conference that the bill should be deferred because "of its technical imperfections and particularly because of its unsound economics."

He proposed: "Let us reduce tax rates rather than increase exemptions so as to preserve the large number of tax payers and still give the public more purchasing power."

Can You Keep a Secret?

New Defense department manual details industry's defense security responsibilities

EVERY EXECUTIVE a cloak-and-dagger man? The Defense department's new industrial security manual involves every defense contractor in a potential drama.

Intended to establish uniform defense security practices in industry, the manual tells government contract holders what they are supposed to do to make sure Uncle Sam's top secrets stay top secret. If you're trying to get a defense contract, the security procedures for precontract negotiations are included too.

Burden on You — The government puts the burden of safeguarding classified information (official information which requires protection in the interest of national defense) right on you, the contractor. It's up to you to determine what employees and subcontractors need the classified information and to see that they have a government O.K. before they get it.

You also have to "provide suitable protective measures" within your plant to safeguard this information. For example, the combinations and dial type padlocks used to lock up classified material have to be changed at least once a year and as soon as possible after the transfer or discharge of any person knowing the combination.

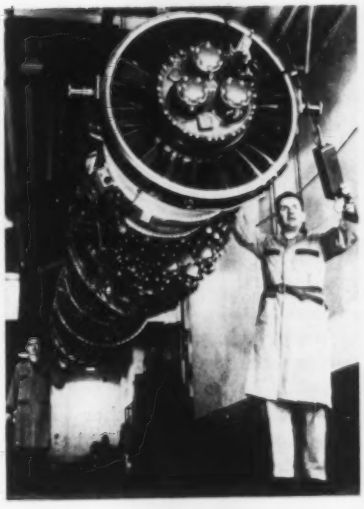
The Responsibilities—You may also have to conduct employee investigations, hire guards and issue employee identification badges or cards. It's also up to you to see that an up-to-date clearance file is kept and that records are kept of classified information.

Even the precautions to be observed when destroying classified material are included in "Industrial Security Manual for Safeguarding Classified Information, DD-441 (Attachment)." It's available for 15 cents from Superintendent of Documents, Government Printing Office, Washington 25.

Needed: Rail Passenger Cars

An interim expansion goal for 1250 new railroad passenger cars by July 1, 1955, has been set by the Office of Defense Mobilization. Rapid tax amortization will be provided as an incentive toward the production of cars.

The goal covers railroad sleepers, coaches and other chair cars, diners and self-propelled passenger cars. The action was recommended by the Defense Transport Administration which notes that seating capacity during the past ten years has dropped from 1.7 million to 1.3 million.



Sabre's Thrust

Pratt & Whitney J-57 Turbojet engine with afterburner powers Air Force's supersonic fighter, North American F-100 Super Sabre, which holds official world speed record of 755 mph

Fast Tax Write-offs Issued

Fast tax write-offs on $49,546,138 were issued by Office of Defense Mobilization in the two weeks ending Apr. 21.

Standard Oil Co. of California got the largest award, $13.7 million for petroleum refining facilities at Richmond, Calif., with 65 per cent allowed on $11.2 million and 45 per cent on $2.5 million.

For a petroleum products pipeline from East Chicago, Ind., to Madison, Wis., Badger Pipe Line Co. recieved a certificate of necessity for $8.9 million with 25 per cent allowed.

Refrigerator freight cars, diesel locomotives, aircraft parts, inland waterways vessels and petroleum storage facilities also came in for sizable awards.

Prod to Shipbuilding

Government plan calls for $400-million a year in new ocean vessel construction

A LONG-RANGE shipbuilding program calling for construction of 60 new ships a year and costing about $400 million a year has been presented to Congress by Robert B. Murray Jr., undersecretary of Commerce for transportation.

The 125-page report states this program would provide jobs for 36,000 workers, a nucleus of shipyard manpower capable of expansion to meet estimated mobilization requirements.

Fattening the Bait — Proposed government incentives to private industry to participate in the program include simplifying and speeding up payments of construction-differential subsidies; tax deferral on money to be put into a construction reserve fund for new vessels; accelerated depreciation on new vessels; government insurance of private mortgages up to 87.5 per cent of the cost of qualified new vessels; and the expansion of research and development programs leading to more efficient operation of American vessels.

On the latter point, Louis S. Rothschild, maritime administrator, said: "Today's dry cargo ship spends 60 per cent of her life in port. This just won't do in today's competitive world. We must . . . get costs down by putting in every conceivable mechanical device for handling cargo . . . We are specially interested in placing research contracts with companies that have had signal success in devising materials handling equipment for other industries. If we get that kind of equipment, our ship owners will have less in-port time and their costs will be lowered."

Government's Share—Just how much of the $400-million-a-year program would be financed by the government "would depend on the difference between the U. S. and foreign costs at the time of construction, the amount of defense features included (for which the government pays), and the number of ships eligible for construction-subsidy payments," said Mr. Murray.

By E. C. KREUTZBERG Washington Editor

U.S. Shapes Plans To Help Keep Industry Going After H-Bombing

MOST "POST-ATTACK" plans by the government and industry have been shaped to meet A-bomb defense requirements. Increased power of the H-bomb makes "post-attack" planning even more imperative and changes basic considerations. The question in many manufacturers' minds is: "What do we do now?"

One of the first steps of the Office of Defense Mobilization is to revamp its fast tax write-off policy regarding "protective construction by private industry." ODM's original policy was to refuse fast tax amortization for new facilities located within 10 miles of a target area. Industrial dispersion, too, was once considered a key factor.

But the H-bomb tests have changed ODM thinking in regard to location importance. Besides, it's impractical to move most of the country's steel plants from the congestion areas to "safer areas." The emphasis now is: Keep out of congested areas to the extent possible, but concentrate on maintaining production and keeping damage at a minimum wherever the plant is located.

BDSA To Promote the Program

Charged with the task of stimulating industry to co-operate in a plan to "maintain continuity of production under enemy attack and to get bombed facilities back into production with least delay" is the Business & Defense Services Administration. Here's what it's urging:

1. Pre-planned Production Transfer—Already in effect by some companies, this plan provides for advance arrangements of transferring production from a bombed plant to another plant properly provided with plans, drawings, specifications, tools, tooling and trained personnel.

2. Alternate Component Sources—Under this provision companies buying parts from nearby plants should arrange for alternate sources located farther away. Alternate supplier will be supplied with specifications and will be properly tooled and staffed to meet parts requirements.

3. Disaster Plans—On the theory that it is better and cheaper to preserve present trained personnel rather than training new crews after a bombing attack, underground shelters should be built. Cincinnati Milling Machine Co. is the nation's number one example of this planning. It has been granted a fast tax write-off (see STEEL, Oct. 12, 1953, p. 93) to build a $500,000 bomb-proof facility.

4. Dispersal of Inventory—Some companies are accumulating reserve stocks of hard-to-get materials and components like gears, motors, bearings, and similar items. These are placed in "safe locations" to be drawn upon in case of need. Officials are strongly urging more of this.

5. Alternate Power Sources—This includes prior arrangement for alternate source of power in an emergency.

6. Dispersal of Records—Many companies are microfilming drawings, specifications, dimensions, tolerances and other technical data to be placed along with vital tools like jigs, fixtures and gages in "safe locations."

7. Dispersion of Management Headquarters—Under this plan companies will provide alternate headquarters in distant "safe locations" from city headquarters so that management can function without interruption in case of bombing.

Getting increasing attention, too, is the idea of birthmarking steel and nonferrous mill products. This would facilitate unscrambling inventories of the items following a bombing attack.

According to ODM and BDSA, the approach to the problem will vary from one company to another. But each company is expected to examine its own situation and plan to maintain production under all possible circumstances.

Hard Goods Spending Holds Despite Appropriations Cut

THE HOUSE appropriated $28.7 billion for defense for fiscal 1955. That's a $1.2-billion reduction from the President's request. However, the cuts will affect mainly expenditures lowered because of reduced personnel. The cuts will not affect materially the estimates that were made for the expenditures for hard goods.

Department of Defense will spend an estimated $14.5 billion in fiscal 1955 for hard goods. That compares with $17.3 billion in fiscal 1954, $17.1-billion in fiscal 1953, $11.5 billion in fiscal 1952 and $4 billion in fiscal 1951. The flow of cash to industry on the basis of present plans will taper off gradually after fiscal 1955.

Expenditures for fiscal 1955

Aircraft	$8,310,000,000
Ship and Harbor Craft	90,000,000
Combat vehicles	280,000,000
Support vehicles	255,057,000
Artillery	39,000,000
Weapons	123,300,000
Ammunition	1,869,700,000
Guided Missiles	659,656,000
Electronics and Communications	675,381,000
Production Equipment and facilities	931,651,000
Other major procurement and production	408,011,000

Fork truck with built-in lasso ... for cowboy drivers

● Over-enthusiastic truck jockeys can't hurt Baker Fork Trucks or loads carried (or themselves) by jumping from "low" to "high" or forward to reverse.

Baker drum-type controllers take motor speed in successive steps through acceleration stages, no matter how "heavy" the foot on the accelerator.

Jack-rabbit starts, with resulting motor burnouts, are impossible. Dynamic braking slows truck to a smooth stop, sparing driver and load, and acts as auxiliary brake on steep grades.

Motor strain or jolt from sudden direction changes is prevented by requiring truck to come to a virtual stop before reversing circuit applies.

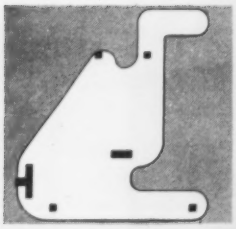
All this adds up to safer operation for driver, truck and load, less down time, lower repair bills and longer truck life.

For more detailed information on Baker Fork Truck features, write for 4-color sketch book —Bulletin 64. The BAKER-RAULANG Company, 1259 West 80th Street, Cleveland 2, Ohio.

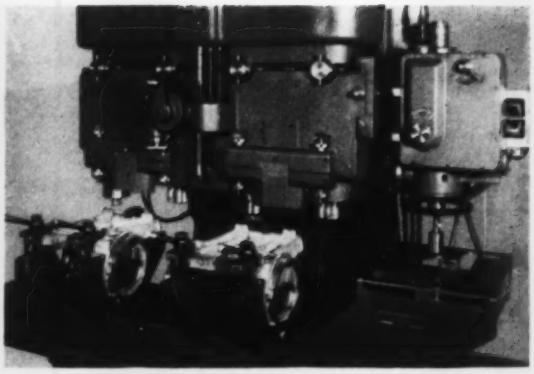
Baker.
industrial trucks

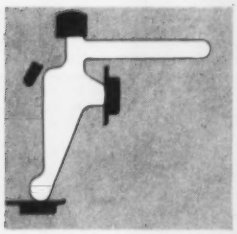
CINCINNATI

An Easy and Economical Way *to mill isolated flat surfaces*

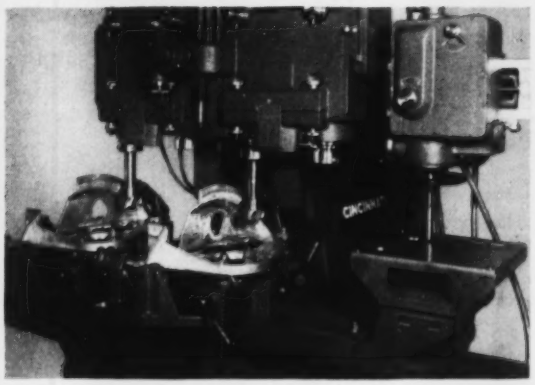


Milled by the automatic profile control method—six pads on aluminum saddle brackets. Approximate production 28 per hour.

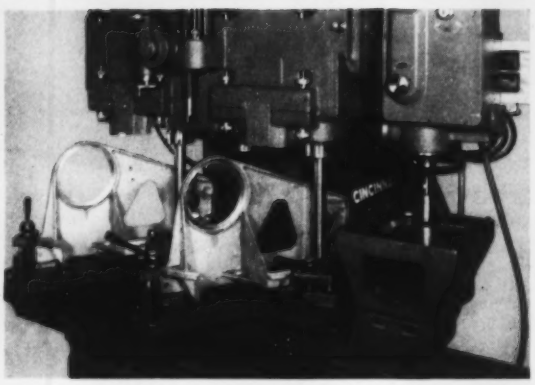




Milled by the automatic profile control method—four pads on aluminum saddle supports. Approximate production 22 per hour.

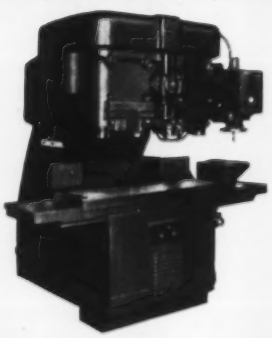


Milled by the automatic profile control method—four pads on these odd shaped aluminum parts. Approximate production 34 per hour.



Here's a new twist that may save you time and money in machining isolated bosses or pads. When a number of machined "islands" are in the same plane, mill them by the automatic profile method. In effect, you're not profile milling, but the automatic profile control unit guides the cutters over each pad in the shortest possible distance. ¶CINCINNATI Four Spindle 360° Automatic Profile Milling Machines offer you the most productive and lowest cost possibilities for work of this type. Three examples are illustrated here. The drawings indicate the path taken by the cutters, and the color spots represent the pads milled. Templates can readily be made from ordinary sheet metal. Brief data about these cost-reducing Automatic Profile Millers will be found in Sweet's Machine Tool Catalog. Complete data in catalog No. M-1215-3.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



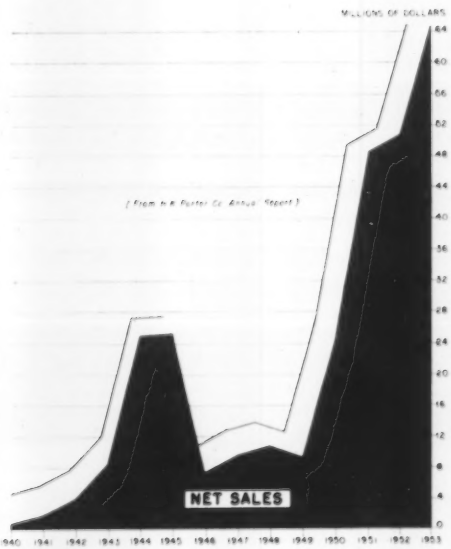
CINCINNATI Four Spindle 360° Automatic Profiling Machine. Catalog No. M-1215-3 contains complete specifications.

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

"DIVERSIFICATION can mean the difference between continuous profit and feast-or-famine finances."

Thomas M. Evans and H. K. Porter Co.'s Story



SALES ARE THE PAYOFF, so Thomas Evans' diversification program is paying off at H. K. Porter Co. as volume skyrockets since 1939.

WHEN SALES DOUBLE in two years and jump 27 per cent the next year, it's proof of aggressive management. That's the reputation of Thomas M. Evans, president of H. K. Porter Co. Inc., Pittsburgh. Porter's sales totaled $24.5-million in 1950, $50.8 million in 1952 and $64.4 million in 1953 as new divisions were added. Now Porter has nine divisions in six states.

Locomotive Producer—Mr. Evans purchased H. K. Porter Co., producer of plant and switching locomotives, in 1939. Porter's growth dates from that year.

After organizing the present company, Yale-educated Mr. Evans purchased and sold firms producing rotary pumps, freight cars, car wheels, industrial springs and steel castings. After World War II he sold locomotive-producing facilities.

Cash Paid—When buying a company, Porter management decides whether to combine it with related activities already owned or operate it as a separate division. Under Mr. Evans' direction, management at the acquired companies is revitalized. "We always pay cash for new companies," he adds. "Sellers want quick liquidation."

"We expanded considerably during the war," Mr. Evans comments. "During consolidation which followed we reorganized slow-moving firms and sold some companies which were losing money steadily."

New Additions—With consolidation completed, Porter began an expansion resulting in purchase of eight companies since December, 1949. Among products of Porter's divisions are electric furnace steel, industrial rubber products, steel bars, electrical equipment, wire rope, hydraulic presses and alloy wire.

"We don't know what will be for sale next year," Mr. Evans admits, "but we are always looking for prospects."

Looking Ahead—"When we buy a company we analyze earnings, promising product line and prospects," says Porter's president. Latest addition to Porter's divisions is McLain Fire Brick Co., Pittsburgh.

As Mr. Evans stresses, "For successful company operation, management can't concentrate on expansion without research and development to improve present products. Development continues despite new purchases."

Brazil Expands Steelmaking Plans

National output was nearly 1 million tons of steel in 1953. Revised plans for new capacity set steelmaking goals at 2.5 million tons by 1956 and 6 million tons by 1960

KEEPING one eye on the potential steel market in South America, Brazilians are expanding plans for steelmaking capacity.

Last year the Brazilian Volta Redonda steel plant produced about 480,000 tons of steel out of a total national output of nearly 1 million tons. With the blowing in of a 1200-ton-per-day blast furnace in February, 1954, output at Volta Redonda is expected to reach about 710,000 tons in 1954 out of a planned national output of 1.4 million tons of steel.

Stays Home Now—Most of Brazil's present production of steel goes toward domestic requirements. For example, Volta Redonda's production of galvanized steel sheets is now almost sufficient to supply the entire Brazilian market. The 1000-ton-per-month output of steel structurals from Volta Redonda has been largely absorbed in expanding the steel plant itself. But present plans, implemented in late 1953, foresee doubling that output which will supply practically all the needs for structurals in planned expansions at Volta Redonda and eventually the open market.

Not content with strides already taken or definitely planned, however, the Brazilian government and steel and iron ore mining interests are considering another steel expansion. This would develop a 900,000-tons-a-year steel mill in Vitoria, Brazil, and another 450,000-tons-a-year plant at Laguna, Brazil.

Revised Targets—Together these expansions would enable Brazilian steel output to rise to 2.5 million tons a year by 1956 and 6 million tons a year by 1960.

Brazilians believe their development as a steelmaking country is a "natural." They point to estimated iron ore reserves (some with as high as 68 per cent iron content) of about 35 billion tons. Coking coal is believed to be in abundant supply in the states of Santa Catarina and Parana and elsewhere. Fluxes also are in abundant supply. For instance, Brazil has the largest known reserves of manganese in the Southern Hemisphere.

And Brazilians haven't forgotten the future customers for their steel. This is the way General Ibere de Matos, Brazilian steel expert, puts it: "Brazil has a growing mass market for the consumption of steel products and is surrounded by countries within easy access which form a potentially large export market."

Shipped with a Running Start

A complete hot strip steel rolling mill, believed to be the first ever shipped intact through the Port of New York, is due for installation this month at Societe des Forges d'Hennebont, Morbihan, France. It took 10 open-top freight cars to transport the complete mill from the E. W. Bliss Co., Salem, O., to the New York port. Consisting of 45 large crates and six pieces of skid-mounted machinery, the new mill was assembled as completely as possible before being shipped

Are Canadians Really?

You will have a much better idea of what kind of people Canadians really are after reading the above-titled booklet published by the Chamber of Commerce of the U.S. It aims to improve U.S.-Canadian relations by exposing some of the misconceptions held by Americans about their northern neighbors. If you do business in Canada or plan to do so, "Are Canadians Really?" can help you by squaring your ideas with many of the facts about Canadians and their country.

Single copies are free to chamber members, and quantities of the booklet are available for a nominal charge.

Bids in on Czech Strip Mill

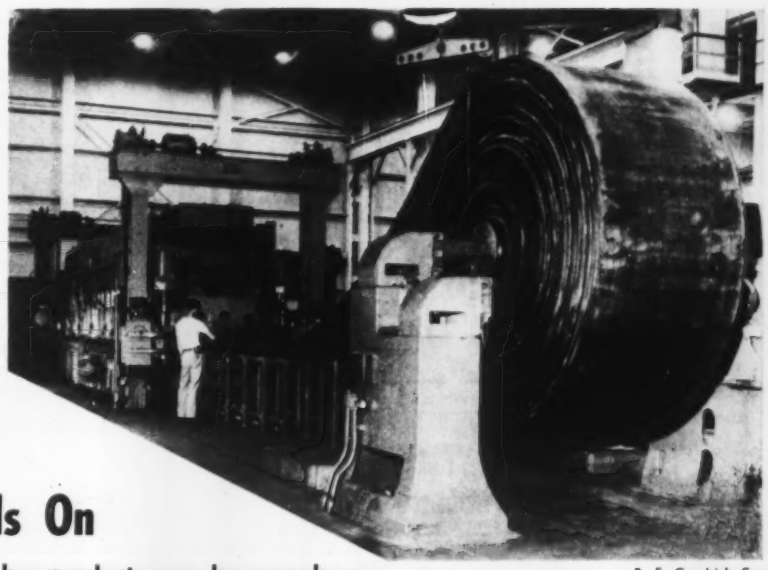
The Argentine firm, Sociedad Mixta Siderurgia Argentina, put in the high bid on the Czechoslovak-owned hot and cold-rolled strip mill for which shipment was embargoed by the U. S. government after the Communist coup in that country. The Argentine bid was $9 million for the mill and all auxiliaries.

The Treasury department has until May 18 to decide whether to accept this or other bids made on the equipment. Nothing that could be used for military purposes will be allowed to go to destinations outside of countries friendly to the U. S.

Revere Copper & Brass Inc. bid

$90,000 on the electrolytic cleaning line; $225,000 on the skin pass mill for tin plate; and $90,000 for the cold sheet mill.

Harvey Machine Co. bid 10 per cent of the cost value on the entire property. Harvey put in four bids altogether on various parts of the equipment, each to be considered in event of rejection of the others.



B. F. Goodrich Co.

Industrial Rubber:

The Sales Pinch Is On

The decline for industrial rubber products may be anywhere from 10 to 20 per cent. Industrymen themselves can't agree. One thing's sure: Competitive selling is back

MANUFACTURERS of industrial rubber goods agree there's a decline coming in sales for 1954 but they disagree markedly on how much of a dip is in prospect. Half believe the years' sales will be off no more than 10 per cent; the other half believe the industry will be lucky to come out 15 to 20 per cent behind 1953 in dollar sales.

One thing is certain. Competitive selling again holds the reins in the industry.

Beating Prices — Crude rubber production easily meets world demand while U. S. synthetic rubber plants are running well below capacity. Prices, especially on engineered products, are being hammered down. As one executive puts it: "On specification items, customers always want a better price than they got last year, and in many cases they're getting it." Smaller firms in the industry are quoting some hard-to-believe prices.

Industrial rubber goods is a catch-all term covering different products for different manufacturers in the field. But hose and belting are common denominators and are a sales indicator for the whole field. A 10-per-cent decline for hose and belting would mean $158 million sales in 1954 compared with 1953's $175 million. In turn, 1953 sales of hose and belting were about 6 per cent under the record year of 1952. Other important industrial rubber goods include molded and extruded parts, adhesives, rubber thread, sponge rubber, metal-backed rubber components, and rubber tank linings for corrosive and abrasive applications.

Helping Hand—New applications and growing trends will help hold up over-all sales performances of industrial rubber products. More rubber goes on individual new automobiles each year; the air springs for General Motors intercity buses are rubber parts furnished by Firestone Tire & Rubber Co.; adhesives for jet aircraft applications may someday mean jet planes with skins held on by stickum.

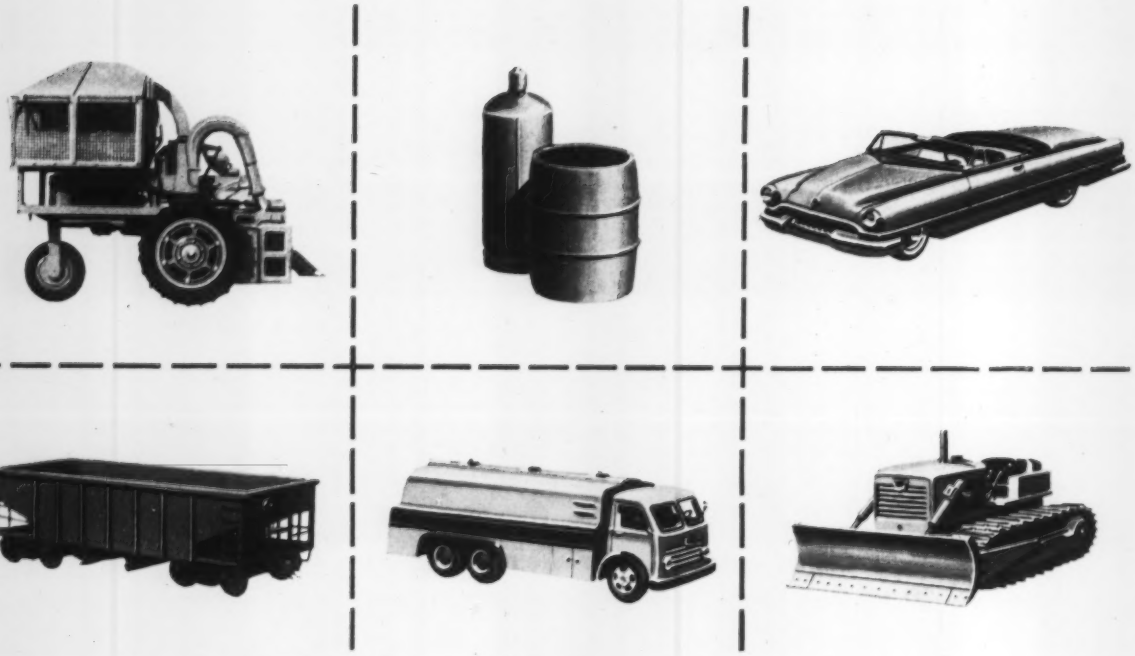
Metal-reinforced conveyor belting applications for longer hauls in mining fields are increasing; Goodyear Tire & Rubber Co. sold what's said to be the first passenger conveyor belt to Hudson & Manhattan Railroad Co. for H&M's Jersey City, N. J., terminal; and rubber linings for fume ducts and pickling, tinning and plating units are increasing.

Taking Hold—Most of the larger rubber companies are getting heavily into plastics. Seiberling Rubber Co.'s L. M. Seiberling speaks for the industry generally when he says his company's new plastics division may well make the firm less susceptible to the ups and downs of its traditional rubber business. New trends in plastics: Plastic belting for punch press applications where oil corrodes rubber belting, plastic structural members and welding techniques for ridgid plastic sheets.

Part of the difference in dollar sales outlook among industrial rubber goods producers stems from the return to prewar buying habits and the inventory adjustment in rubber similar to that taking place in metals. Rubber manufacturers are being forced to keep the inventory of rubber goods.

Ready To Roll — Despite the changing conditions, there's little pessimism. Says H. E. Humphreys Jr., chairman, U. S. Rubber Co., "Since November, 1953, our average daily rate of sales (total) has been increasing each month. March sales were very encouraging." K. N. Carter, sales manager, Ohio Rubber Co., adds, "While the first quarter has been somewhat under that of the past several years, we look forward to a favorable third and fourth quarter."

C. O. DeLong, president, B. F. Goodrich Industrial Products Division, puts it much stronger: "This company's industrial products division is continuing to expand facilities to increase production of latex thread, latex-dipped products, industrial hose and plastic products. We expect that 1954 will rank close to, or along with, the second and third best years in our history."



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N-A-X HIGH-TENSILE STEEL

You can design light weight, longer life, and economy into your products by including N-A-X HIGH-TENSILE in your plans.

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It polishes to a high lustre at minimum cost.

And with all these physical advantages over mild carbon steel—it can be cold formed as readily into the most difficult shaped stamping.

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NATIONAL STEEL CORPORATION

SPORTS CAR CLASSES

CLASS A—Over 5500 CC
Usually contains only bored Cadillac and Chrysler engines.

CLASS B—5000 to 5500 CC
Usually Allards with stock displacement Cadillacs, Chryslers, etc.

CLASS C—3000 to 5000 CC
Covers the Jags and smaller American engines as well as the larger Ferraris.

CLASS D—2000 to 3000 CC
Cars like the Riley, Morgan, Austin-Healey, smaller Ferraris and smaller American-engined jobs.

CLASS E—1500 to 2000 CC
Usually dominated by Fiat-engined Siatas and blown MG's.

CLASS F—1100 to 1500 CC
Swamped with MG's, Simcas, Singers and Porsches, dominated by Osca's.

CLASS G—750 to 1100 CC
This and the classes which follow are the wee ones, largely Crosley powered in class H ranging down to outboard and motorcycle engines.

CLASS H—500 to 750

CLASS I—350 to 500

CLASS J—Under 350

Sports Car Racing: Both Fun And Auto-Test Opportunity

WASHINGTON, D. C. THE ATTENTION of about 100,000 people in and near the nation's capital shifted from political show business to sports car racing last week end at Andrews Air Force Base. And while sports car racing is primarily a point of order, the change was otherwise considerable.

To Race—If you're a normal golf-playing American man, you probably are aware that sports cars, beyond being fun to drive normally, are also built to be raced. It's this latter qualification that somewhat weakens the status of a Corvette as a sports car as pointed out in this column last week and sends the "sports cars" of the Skylark type literally rolling by the wayside.

But though you may be aware that sports cars can be raced, probably you're a little fuzzy on who does the racing and where.

Road Problem—Ideally, sports car races are held on normal roads putting the car in its native element. To a large extent in Europe where the number of cars is still relatively small and road-racing holds the position of baseball here, that happy condition still exists. But in this country, closing roads is a major problem, and even if the roads are closed, some hollow-headed spectator is bound to get himself out on the course and get hit despite the best possible crowd control methods.

That's why, although road racing was revived in this country on roads shortly after World War II, it has since made a major shift to airports and you'll find the bulk of "road" races on runways today. On an airport crowds can be kept hundreds of feet from the course and still be able to see, and the drivers can get all crossed up and have plenty of room to let things work themselves out. It loses the realism of a road course, to be sure, but it does have a strong safety factor to commend it.

Personnel Problem—As to who does the racing, for the most part it's men probably very much like yourself. Most are in their thirties or forties, have achieved more than the usual financial success, and take pride in the way they can handle an automobile. They race automobiles as a sport, for the competitive thrill that it affords. And before you brand tearing around an airport at 100 to 150 mph as ridiculous, don't forget that hitting a little ball into a cup doesn't look entirely rational from an objective standpoint. Sports car racing, like every sport, can best be justified by the pleasure of the doing.

On the other hand, you can buy a heck of a lot of golf balls for the price of a $20,000 Ferrari, and even with a lowly $2500 MG you can figure on using a set of $125 tires every time you run a major race. Add to that the miscellan-

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eous engine repairs, occasional body work and frequent brake relining, and it becomes evident that you have to be fairly well heeled to be a regular competitor.

The Point—But in the spectator department, sports car racing is no slouch. When Bill Spear or Jim Kimberly come down a straight at 150 mph with an exhaust note that's like pushing a long needle through your ear drum and slowly withdrawing it, you find sports car racing a thing that's mighty hard to ignore. And when you've seen these boys drift through a bend at speeds many people would avoid on a turnpike, you begin to understand the thrill of intimacy of man and machine.

One of the things that may prove confusing at your first race is the fact that there are races within the race. With ten basic classes determined by the displacement of the engine (see table) and modified and production cars in each class, it would take about 20 races to handle all the groups. For that reason, classes are combined, and you'll see the big jobs lapping the small fry that are actually leading the cars they are competing against. You'll enjoy watching, even if you don't quite know what's going on, but with close attention to the program and a sharp eye you can keep track of what's up.

Practical Benefits—Some of the sharpest eyes are those of the automotive engineers who regularly attend many of these races. Sports car drivers with not only enthusiasm but also ideas to improve their cars continually come up with things of interest to Detroit academically, often devices of practical interest.

Undergoing tests at the Andrews Race, for example, was a newly developed limited-slip differential developed by Lyeth Engineering Co. in Detroit. The way that car went through corners had more than one engineer interested, not to mention several drivers who got a fleeting look at the rear. Also inspected with high interest was Briggs Cunningham's new job with liquid-cooled brakes, which unfortunately was not yet ready to race. Suspension is another area where the sports car interests the automotive engineer highly.

Same Aim—Perhaps the significance of the sports car to the automotive engineer can best be described by pointing out that though it may be running on an airport, the sports car is a road racing machine. It is designed to transport people over normal roads as quickly and safely as possible. And that, within the handicap of consumer demand, is what the Detroit designer is trying to do as well.

There are already Olds, Cadillac, Lincoln and Chrysler engines in Allards as well as the Chrysler-powered Cunningham. There are Crosley engines in Siatas and Bandinis, and the American-built Kurtis-Kraft is being powered with such engines as the Mercury. Within the next year it is expected that the Ford Thunderbird will be actively entered in competition, and when that happens the Corvette and Kaiser-Darrin will not be far behind.

There will be more than 30 major sports car races throughout the United States this year. If you avail yourself of the opportunity to see one you'll not only witness a great show, but get an inside look at a growing automotive proving ground as well.

Car of the Week

If you're going to leave your sports car in the garage and drive a conventional car to the race, you probably can't pick anything less heretical for the job than a Lincoln. This car remains one of the nicest handling products on the road with surprising cornering and noticeable absence of wander at speed.

That's hardly surprising since there have been no major mechanical changes in the car this year, and all those characteristics were present last year. By the same token, the engine still turns in nice performance and is hardly outclassed by its more horsepowerful competitors. The big treatment this year was in interior and exterior changes, not necessarily improved a great deal but different and nice.

Still noticeable is the Hydra-Matic jerk which will be corrected next year when Lincoln switches to a new "Linc-o-matic" transmission combining the present Ford and Mercury torque convertor smoothness with a new double shifting planetary gear setup to preserve much of the present performance. The new transmission, incidentally, will also be provided on Fords and Mercurys; it's now being tooled at the Livonia, Mich., former tank plant.

The '54 Lincoln continues to be a top-flight car. With a new body and chassis next year, as well as the new transmission, it should be a most interesting car indeed.

Exhaust Notes

Speaking of transmissions, Packard is also readying a new transmission to replace Ultra-matic which might pose somewhat of a name problem. Where do you go from ultra? At any rate, the unit will be introduced on '55 models along with the new V-8; it'll be made at the same plant in Utica, Mich.

Holdup on the Corvette fibreglass auxiliary top is reportedly a matter of price. The firm presently working on the job is having trouble getting the item down to attractive levels. Incidentally, expect the Corvair hardtop version of the Corvette to be coming along one of these days. Contracts for the job reportedly have already been let.

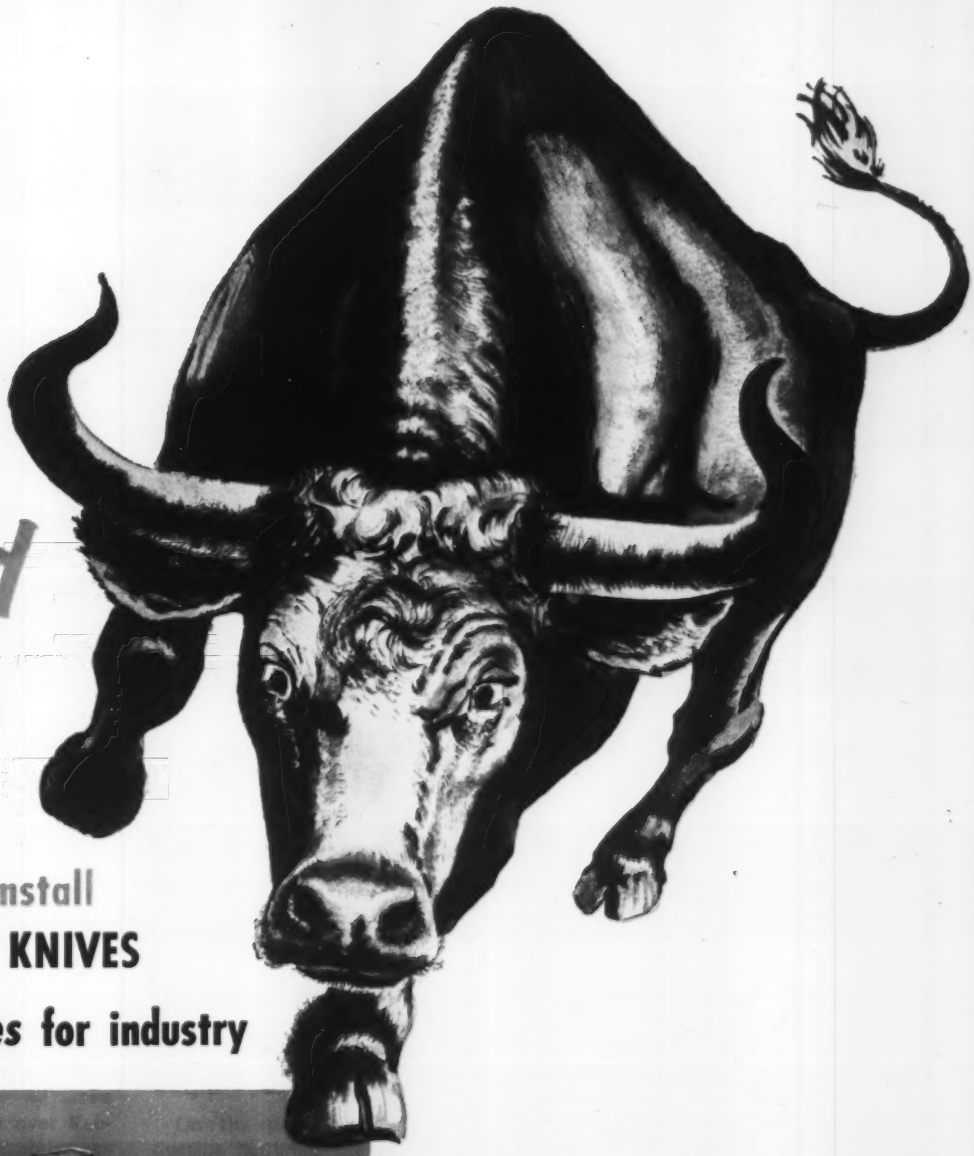
Auto, Truck Output

U. S. and Canada

	1954	1953
January	594,789	614,000
February	573,801	628,017
March	672,485	752,149
April		782,453
May		685,390
June		713,206
July		757,595
August		641,152
September		605,228
October		651,153
November		457,852
December		529,588
Total		7,817,783

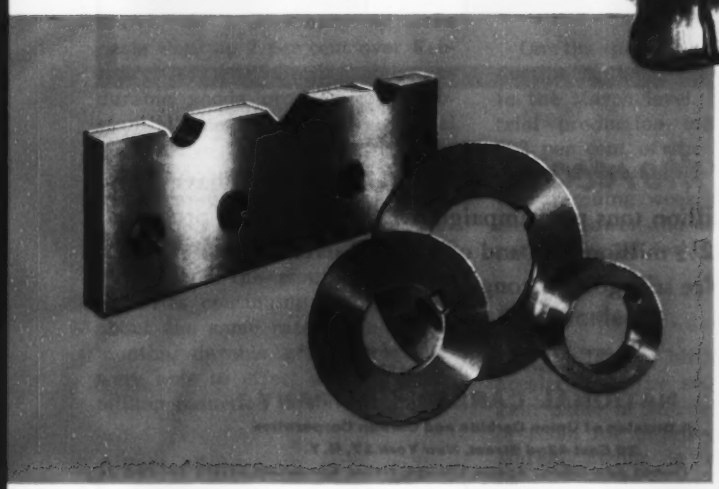
Week Ended	1954	1953
Apr. 3	146,498	170,567
Apr. 10	152,074	176,783
Apr. 17	148,559	162,171
Apr. 24	157,710	194,610
May 1	155,523	184,800
May 8	156,000*	179,621

Source: Ward's Automotive Reports.
*Estimated by STEEL.



built for
rugged action

Heppenstall
SHEAR KNIVES
***durable blades* for industry**



Many leading plants make Heppenstall their standard specification for shear knives. Heppenstall's record for durability provides such production advantages as:

- **MORE CUTS BETWEEN GRINDS**
- **MORE UNITS PER BLADE**
- **LOWER OVERALL BLADE COST**
- **INCREASES IN PRODUCTION**

The reasons may be found in Heppenstall's high standards for the development and manufacture of shear knives. Made from high quality, electric induction steels, these long-lasting knives are famous wherever hot and cold, ferrous and non-ferrous metals are cut and sheared.

Make Heppenstall *your* standard specifications.

Heppenstall

The most dependable name in forgings

PITTSBURGH 1, PENNSYLVANIA

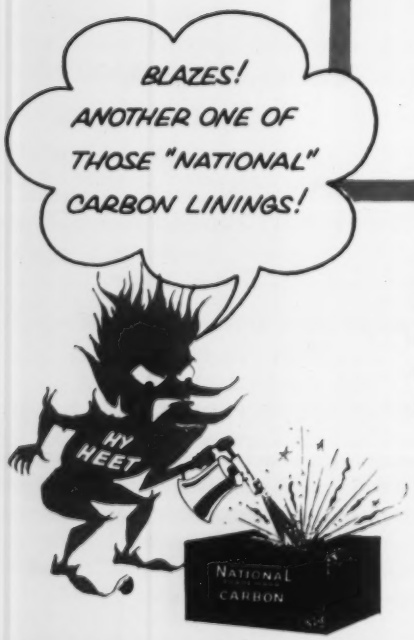
Sales offices in principal cities

Why has the steel industry invested in 108 NATIONAL CARBON TRADE-MARK blast furnace linings?

"National" carbon is found in more than 40% of this country's blast furnaces.

Why? Like any other investment by cost-minded steel producers, "National" carbon linings are bought on the basis of consistent, *proved* performance. Again and again, in over a hundred campaigns, "National" carbon linings have delivered:

- ***Consistently* longer life**
- ***Consistently* smoother operation (even during blow-in after bank)**



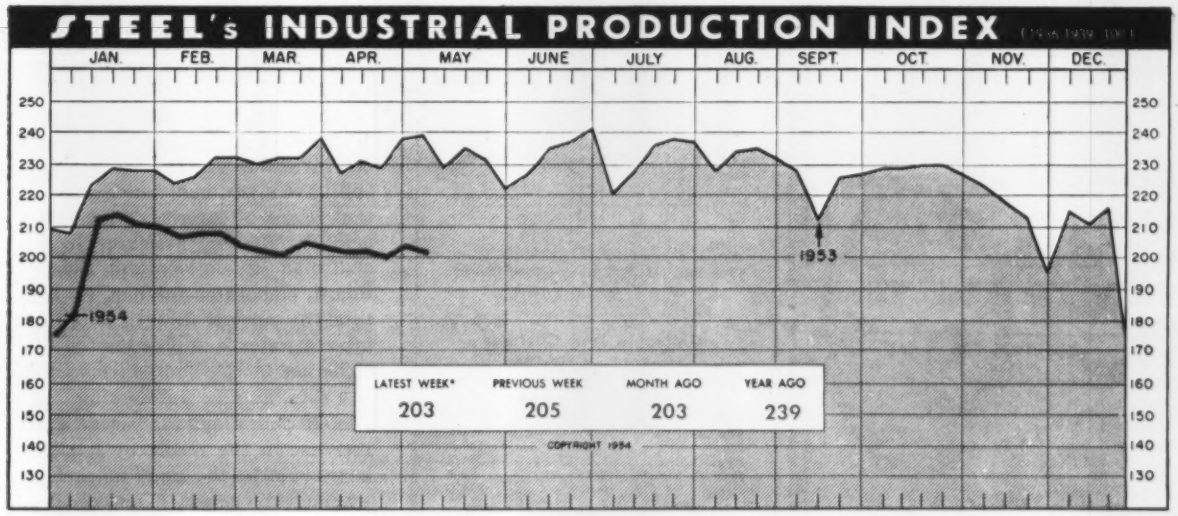
Here's the record: **31** "National" linings have *averaged* **2½** million tons per campaign. Of these, **18** have produced *more* than **2½** million tons and one is well over the **3¼** million mark. They're still going strong!

The term "National" is a registered trade-mark of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.
District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
IN CANADA: Union Carbide Canada Limited, Toronto

NATIONAL CARBON PRODUCTS

BLAST FURNACE LININGS • BRICK • CINDER NOTCH LINERS • CINDER NOTCH PLUGS • SKIMMER BLOCKS • SPLASH PLATES • RUNOUT TROUGH LINERS • MOLD PLUGS • TANK HEATERS



*Week ended May 1

Based upon and weighted as follows: Steelworks Operations 35%, Electric Power Output 23%, Freight Car Loadings 22%, and Automobile Assemblies (Ward's Reports) 20%.

Manufacturers' Sales Nearly Match Year-Ago Level

THE CURRENT business pickup at the manufacturing level dates back to March. Latest figures of the Office of Business Economics show that manufacturers' sales increased during the month while inventories continued to decline. Manufacturers' sales at $25.3 billion, though $1.5 billion below the level of last March, on a seasonally adjusted basis were up 2 per cent over February for both durable and nondurable goods producers. A substantial rise in sales of electrical machinery and motor vehicles largely accounted for the gain in the durable goods sector.

Manufacturers' inventories, seasonally adjusted, declined $400 million during the month. With inventories continuing to decline at about the same rate as in earlier months, durable goods producers were able to effect another $300-million reduction in their stocks.

A Better Future . . .

Like sales, new orders, seasonally adjusted, rose above the February level. At $23 billion, new orders were $1 billion higher than in the previous month. The lion's share of this gain, $700 million, was garnered by durable goods industries.

The rise in new orders substantially reduced the rate of backlog decline. The unadjusted decline of $1.2 billion was the lowest in recent months.

Output Slides Temporarily . . .

On the preliminary basis, production in the latest week dropped to the March level. STEEL's industrial production index registered 203 per cent of the 1936-1939 average, 2 percentage points below the preceding week. Reductions in electric power and automobile output accounted for the slide.

Help Wanted . . .

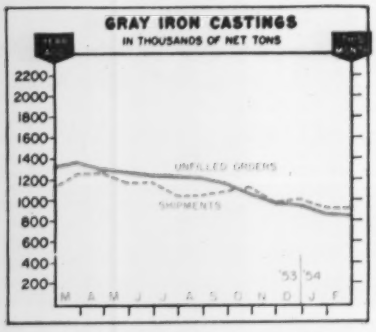
While factory hiring currently is accelerating, the smallness of the gain made in March leaves plenty of room for improvement. During March, hiring in manufacturing plants rose 12 per cent above February to total 28 new employees per 1000 old employees. Though the over-the-month jump was slightly more than usual, the rate of hiring during the month was the lowest reported for March in recent years, the Department of Labor relates.

Layoffs in March totaled 23 per 1000 employees, virtually unchanged from February. While this number of layoffs is high compared with recent years it is well below the postwar peak for the month reached in 1949.

In Good Shape Financially . . .

Despite the current business decline, corporations should improve their financial position again this year. Corporate working capital should rise once again in 1954. Last year it increased $2.8 billion to total $92.7 billion, according to the Securities and Exchange Commission. This year, unhampered by the excess profits tax, it may rise even higher. Should this occur, the declining trend of working capital accretion begun in 1951 would be broken.

Concurrent with the increase in working capital last year, corporations invested $24.0 billion in plant and equipment. And internal sources provided approximately three-fourths of the funds needed. Only $7.2 billion was obtained from external sources—$2.0 billion from

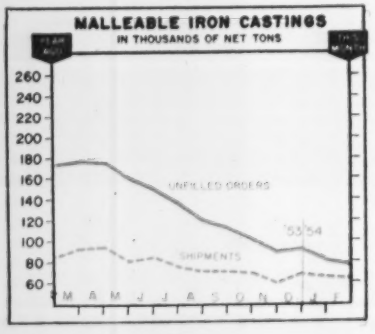


Gray Iron Castings

Thousands of Net Tons

	Shipments		Unfilled Orders*	
	1954	1953	1954	1953
Jan.	932	1,162	872	1,333
Feb.	936	1,136	865	1,332
Mar.	...	1,264	...	1,376
Apr.	...	1,277	...	1,306
May	...	1,186	...	1,272
June	...	1,196	...	1,246
July	...	1,056	...	1,233
Aug.	...	1,069	...	1,223
Sept.	...	1,106	...	1,170
Oct.	...	1,142	...	1,076
Nov.	...	1,004	...	977
Dec.	...	1,032	...	955
Total	...	13,630		

*For sale. U. S. Bureau of the Census.

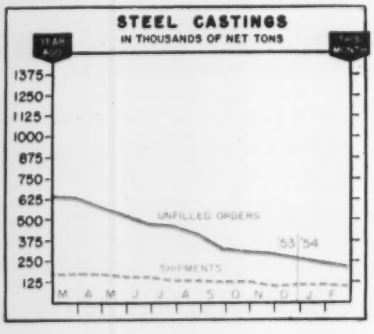


Malleable Iron Castings

Thousands of Net Tons

	Shipments		Unfilled Orders*	
	1954	1953	1954	1953
Jan.	70.3	87.2	85.6	174.8
Feb.	69.1	86.5	81.6	175.1
Mar.	...	94.5	...	177.8
Apr.	...	95.9	...	174.5
May	...	82.1	...	160.4
June	...	86.5	...	151.0
July	...	77.1	...	137.3
Aug.	...	73.9	...	120.8
Sept.	...	74.3	...	114.5
Oct.	...	73.5	...	104.0
Nov.	...	63.4	...	93.2
Dec.	...	72.1	...	95.6
Total	...	966.9		

*For sale. U. S. Bureau of the Census.

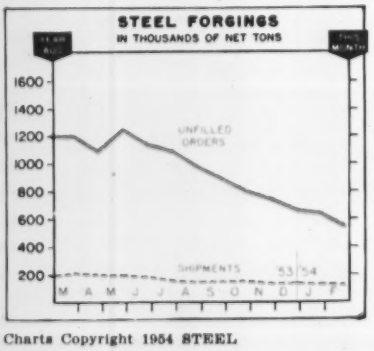


Steel Castings

Thousands of Net Tons

	Shipments		Unfilled Orders*	
	1954	1953	1954	1953
Jan.	122.8	167.2	251.8	706.5
Feb.	116.5	175.7	234.6	644.3
Mar.	...	182.2	...	634.6
Apr.	...	179.6	...	573.6
May	...	165.6	...	525.0
June	...	164.7	...	475.8
July	...	139.6	...	467.9
Aug.	...	141.3	...	418.9
Sept.	...	135.3	...	327.2
Oct.	...	140.7	...	313.7
Nov.	...	114.1	...	308.5
Dec.	...	123.3	...	278.4
Total	...	1,829.3		

*For sale. U. S. Bureau of the Census.



Steel Forgings*

Thousands of Net Tons

	Shipments		Unfilled Orders	
	1954	1953	1954	1953
Jan.	139	184	638	1,207
Feb.	127	184	539	1,199
Mar.	...	200	...	1,197
Apr.	...	196	...	1,082
May	...	191	...	1,239
June	...	185	...	1,135
July	...	155	...	1,081
Aug.	...	151	...	974
Sept.	...	153	...	882
Oct.	...	156	...	798
Nov.	...	143	...	740
Dec.	...	143	...	651

U. S. Bureau of the Census. *Data based on reports from conmmercial and captive forge plants with monthly shipments of 50 tons or more.

Charts Copyright 1954 STEEL

Issue Dates on other FACTS and FIGURES Published by STEEL

Construction .....Apr. 26	Gears .....Apr. 12	Ranges, Elec. ....Apr. 19
Durable Goods ....May 3	Indus. Production..May 3	Ranges, Gas .....Mar. 22
Employ., Metalwk..Apr. 5	Ironers .....Apr. 12	Refrigerators .....Apr. 19
Employ., Steel ....Apr. 26	Machine Tools ....Mar. 8	Steel Shipments ...Apr. 12
Fab. Struc. Steel..Apr. 19	Prices, Consumer..Mar. 22	Vacuum Cleaners..Apr. 5
Foundry Equip. ...May 3	Prices, Wholesale..May 3	Wages, Metalwk. ..Mar. 1
Freight Cars. .....Apr. 26	Pumps .....Mar. 15	Washers .....Apr. 12
Furnaces, Indus. ..Apr. 19	Radio, TV .....Apr. 26	Water Heaters ....Mar. 22

new stock issues and $5.2 billion from new bond offerings.

Time To Borrow? . . .

Concerning capital outlays this year, the "Federal Reserve Bulletin" says the securities market is favorable. Factors making the market favorable are the ready availability of investment funds and current levels of interest rates. Winfield W. Riefler, assistant to the chairman of the Federal Reserve Board, elaborates further. He says that the current drop in long-term interest rates is unprecedented. The situation in the short-term money markets is also interesting. Mr. Riefler points out the recent sharp increase in the resort by qualified borrowers to the open market for commercial paper. This occurred when the prime loan rate became unattractive.

The Rush to Repay . . .

Readily available also but being paid off rapidly by consumers instead is installment credit. The amount of this credit outstanding decreased $251 million in March. This most substantial decline was, however, a reduction from the rate of the last few months. It compares with an increase of $409 million in March of last year and a decrease of $44 million during the same month in 1951. In the latest month the decline centered in automobile paper, reduced $115 million, and in other consumer goods paper, which was cut by $157 million.

Initiative Unbounded . . .

That people are exercising considerable initiative in meeting the present business decline is revealed by the sharp increase in new business incorporations in March. The number of stock corporations chartered during the month totaled 10,514, the highest for any previous month in over six years, according to Dun & Bradstreet Inc. The 23.2-per-cent gain in March raised the number of incorporations in the first quarter to 28,590, the highest first three months total since 1947.

Good Forecasters . . .

Right now it looks as if the 1954 forecasts made by the automobile

BAROMETERS OF BUSINESS

	LATEST PERIOD	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,632	1,636	2,262
Electric Power Distributed (million kwhr)	8,390	8,257	7,939
Bitum. Coal Output (daily av.—1000 tons)	1,125	1,115	1,504
Petroleum Production (daily av.—1000 bbls)	6,575[1]	6,586	6,276
Construction Volume (ENR—millions)	$241.1	$248.0	$288.0
Automobile, Truck Output (Ward's—units)	155,523	157,710	184,800
TRADE			
Freight Car Loadings (unit—1000 cars)	623[1]	626	781
Busine.s Failures (Dun & Bradstreet, no.)	234	229	169
Currency in Circulation (millions)[3]	$29,645	$29,673	$29,787
Dept. Store Sales (changes from year ago)[3]	−2%	+12%	−1%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$18,436	$17,977	$17,292
Federal Gross Debt (billions)	$270.1	$269.9	$264.5
Bond Volume, NYSE (millions)	$19.1	$17.4	$17.2
Stocks Sales, NYSE (thousands of shares)	11,202	9,896	6,376
Loans and Investments (billions)[4]	$78.9	$78.7	$76.4
U. S. Gov't Obligations Held (billions)[4]	$31.5	$31.3	$29.4
PRICES			
STEEL's Finished Steel Price Index[5]	189.74	189.74	181.31
STEEL's Nonferrous Metal Price Index[6]	213.3	213.9	221.1
All Commodities[7]	111.1	111.3	109.4
Commodities Other Than Farm & Foods[7]	114.6	114.6	113.2

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1954, 2,384,549. 1953, 2,254,459. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100.

producers were "on the nose." The two-millionth passenger car of 1954 left the assembly line May 4. Thus far in 1954, production is only 7.8 per cent behind the comparable 1953 period and completion of the scheduled January-June program will establish outturn during the first half of 1954 as the third highest in history, *Ward's Automotive Reports* says.

Truck Outturn Down . . .

Domestic truck production during the same period has not fared as well. Output in the first four months totaled only 381,354 units, 19 per cent below the comparable period last year.

All Were Producing . . .

During the week ended May 1, for one of the few times this year, all automobile producers worked their major plants. This situation has not continued, however. As of May 3, Packard Motor Co. said it would suspend automobile production for two weeks. Nash-Kelvinator Corp. also plans to lay off some of its employees—about 900 in its automotive divisions at Milwaukee and Kenosha, Wis.

Though these actions were taken to correct inventory imbalances, the daily rate of domestic new car retail sales in the period from Apr. 11 to 20, increased 12 per cent over the preceding 10-day period. That made sales during the period the liveliest since mid-1953.

Better Business Ahead . . .

Also continuing to show improvement is the new order index of industrial supplies and machinery. During March, new orders for these products rose 1 percentage point above the preceding month to register 141.5 per cent of the July, 1948, average, the American Supply & Machinery Manufacturers' Association reports. As this index is running counter to the Federal Reserve's industrial production index it suggests an early reversal, though not a sizable one, in the general production trend.

Ore Loadings Rise . . .

Another indication of a change for the better is found in railroad loadings of ore. During the week ended Apr. 24, loadings of ore increased 13,953 cars above the preceding week, the Association of American Railroads relates. Loadings of all products were thereby boosted to the second highest level this year.

Which kind of Cold Rolled Strip Steel is best for You ?

CONSIDER SHEET COIL

—if variations in physical characteristics are permissible.
—if fairly heavy oversize gauge variations are not objectionable.
—if the fabricating operations are not too complicated and do not require intricate expensive dies.
—if a fine surface finish is not essential.
—if a good base for paint or enamel is desired.
—if you do not object to some "square footage" loss due to oversize variation.
—then Sheet Coil will probably be the most economical material for the job.

CONSIDER THINSTEEL

—if you must have a high degree of uniformity of chemistry and physical properties—and precision gauge tolerances.
—if you wish to keep die wear low, no oversize gauge variations.
—if you require a fine finish or a better base for plating.
—if you want maximum yield for "most finished parts per ton."
—if you want selected tempers for maximum strength and lightest weight.
—then you'll find Thinsteel the most economical material by far.

No Argument Here.... Kenilworth Stocks Both

You can always count on Kenilworth helping you get the right steel for your requirements. Order Sheet Coil or Thinsteel and notice that each coil carries an identifying tag as pictured above. Call on Kenilworth, too, for your needs in Stainless Sheets or flat rolled Spring Steels (Annealed or hardened and tempered).

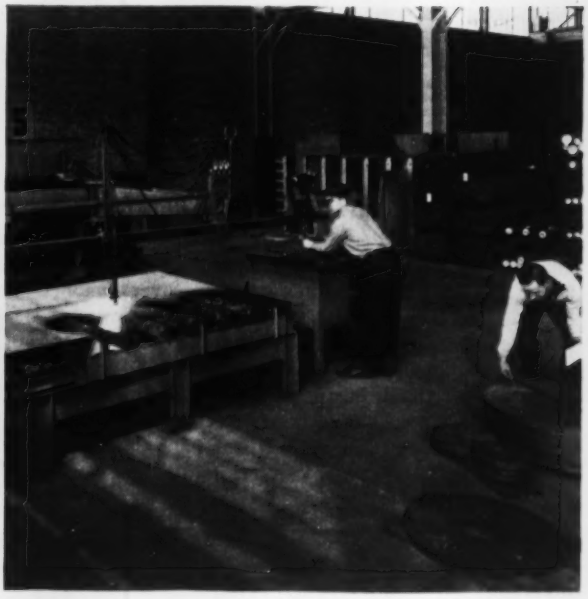
THE Kenilworth Steel co.
750 BOULEVARD,
KENILWORTH, NEW JERSEY
SPECIALISTS IN FLAT ROLLED METAL PRODUCTS
Telephones: N. Y. COrtlandt 7-2427
N. J. UNionville 2-4900
Teletype: Roselle, N. J., 387

To Cut Your Costs....

LET US **FLAME-CUT**

YOUR SPECIAL SHAPES

FROM CARBON OR STAINLESS STEEL



Now you can have the accuracy of electronic-eye, multiple torch plate burner equipment to give you the special shapes you need flame-cut from carbon steel. And, if it's stainless shapes you want, the House of Stainless has the flame-cutting equipment to handle these requirements, too.

In either case, you can count on having your exact specifications met quickly and at substantial savings in cost to you.

Remember, too, our stocks of both stainless and carbon steel items are complete. Just call LAfayette 3-7210 whether you need special shapes or stock material.

The House of Stainless — CSSC AT YOUR SERVICE — JILL

CHICAGO STEEL SERVICE CO.

Kildare Avenue at 45th Street, Chicago 32, Illinois Telephone LAfayette 3-7210

MILWAUKEE DISTRICT OFFICE: 757 North Broadway, Milwaukee 2, Wisc. Telephone: BRoadway 2-7874
MINNEAPOLIS DISTRICT OFFICE: 3501 Hennepin Avenue, Minneapolis 8, Minn. Telephone: COlfax 2602
Sales Representatives at Bloomington, Moline and Rockford, Illinois; Indianapolis and South Bend, Indiana; Cedar Rapids, Iowa; Grand Rapids, Michigan; Fond du Lac, Wisconsin.

HENRY S. WINGATE
. . . Inco president

JEFFERSON S. GAMBLE
. . . Associated Spring sales mgr.

ARTHUR W. McKINNEY
. . . heads National Supply

Henry S. Wingate, vice president and a director, was elected president of **International Nickel Co. of Canada Ltd.,** Copper Cliff, Ont. He was also elected to membership on the executive committee of the company and to the presidency of its U. S. subsidiary, International Nickel Co. Inc. **F. M. A. Noblet,** assistant treasurer, was elected treasurer of both companies. Mr. Wingate succeeds **Dr. Paul D. Merica** and Mr. Noblet succeeds **W. J. Hutchinson,** both retired. They will, however, continue as directors and members of the executive committee and as consultants. **J. Roy Gordon,** vice president and a director, transfers from Copper Cliff to make his headquarters in New York.

George D. Behlen was made vice president-general manager of **United States Electrical Tool Co.,** Cincinnati. This concern was recently sold by Emerson Electric Mfg. Co. to a group of Cincinnati business men.

J. B. Beaird Co. Inc., Shreveport, La., promoted **Charles T. Beaird** to vice president, **John L. Tullis** to vice president and general manager of sales and **Melvin F. Johnson** to secretary. In addition to his new position, Mr. Beaird is president and general manager of J. B. Beaird Co. Inc. of California, located at Stockton.

Jefferson S. Gamble was appointed sales manager of **Associated Spring Corp.'s** Bristol, Conn., divisions which include Wallace Barnes Co., Dunbar Bros. Co., F. N. Manross & Sons Co. and Wallace Barnes Steel Division. Mr. Gamble succeeds **Harold B. Reid** who will retire July 1. **Joseph T. Domingue** replaces Mr. Gamble as assistant sales manager in charge of spring sales at Bristol.

Raymond F. Allen was elected vice president of **H. K. Porter Co. Inc.** and placed in charge of its **Buffalo Steel Division** at Buffalo. He succeeds **August E. Klinger,** retired.

E. J. Tribble, former works manager of **Worthington Corp.'s** Harrison, N. J., Works, was named assistant vice president in charge of manufacturing. **A. M. Tullo** assumes Mr. Tribble's former position and is replaced at the Wellsville, N. Y., Works by **L. E. Hammer** as works manager.

Gray Screw & Bolt Division, Chicago, Pittsburgh Screw & Bolt Corp., appointed **Robert G. Roy** general manager, **Robert Lowery III** assistant general manager, **W. N. Hoelzel** general manager of sales and **John C. Jewett** assistant general manager-sales.

J. R. Waterfield was named treasurer, **Lawndale Enameling Co.,** Chicago.

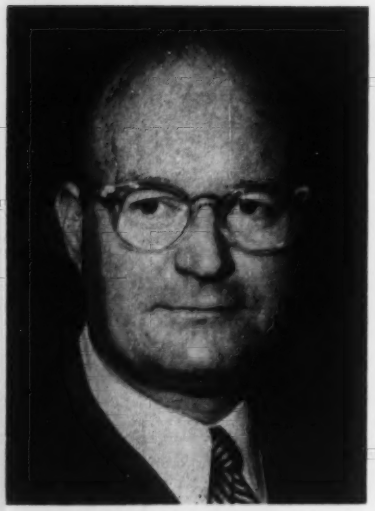
Arthur W. McKinney was elected president of **National Supply Co.,** Pittsburgh. He succeeds **Alexander E. Walker** who was re-elected chairman of the board and chief executive officer of the company. Mr. McKinney has served as executive vice president since 1948.

Paul B. Brown was made a director of **Abrasive & Metal Products Co.** In addition he was appointed president and general manager of **Peninsular Grinding Wheel Division** and president of the subsidiary, **Peninsular Grinding Wheel Sales Corp.,** Detroit. He joined Peninsular in 1953 as vice president and general manager. Associated with the grinding wheel industry for the last 28 years, Mr. Brown served with Norton Co. and later with Carborundum Co.

George V. Dutney was made special assistant to the president of **Nordberg Mfg. Co.** He will have headquarters in the company's New York office.

New officers of **Mills Industries Inc.,** Chicago, are: **A. E. Tregenza,** president; **Richard F. Dooley,** executive vice president; **Walter F. Hermann,** vice president in charge of manufacturing and **G. T. Lawler,** treasurer.

Lindberg Engineering Co., Chi-



HOWARD L. CLARY
. . . Affiliated Gas Equipment v. p.

RAYMOND B. KROPP
. . . Kropp Forge chairman

WESTON G. THOMAS
. . . Climax Molybdenum executive v. p.

cago, appointed **Robert A. Foley** salesman for its Chicago district office.

Howard L. Clary, assistant general manager and director of sales of Bryant Heater Division, was elected a vice president of the parent company, **Affiliated Gas Equipment Inc.,** Cleveland. He joined the corporation last November, prior to which time he was vice president at the Norge Division of Borg-Warner Corp.

Judson S. Sayre, long an executive in the home appliance field, was elected a vice president of **Borg-Warner Corp.,** Chicago, and president-general manager of its **Norge Division.** For many years president of Bendix Home Appliances Inc., he became its general manager when that organization was acquired as a division by Avco Mfg. Corp. in 1950. In February, 1951, he was made vice president of Avco.

Rodney C. Gott, a director and vice president of **American Machine & Foundry Co.,** New York, was elected executive vice president.

Fred W. Bush was appointed assistant to the vice president in charge of transformer and switchgear equipment at **Allis-Chalmers Mfg. Co.,** Milwaukee. **Raymond O. Bell** was assigned to the transformer and switchgear organization to handle special assignments.

Raymond B. Kropp, executive vice president and treasurer, **Kropp Forge Co.,** Chicago, was elected chairman of the board and its chief executive officer. He continues as treasurer. **John H. Nelson** was named works manager of the Chicago plant.

A. J. Fitzgerald was elected president of **Holsman Mfg. Co.,** Cleveland.

Luria Bros. & Co. Inc., Philadelphia, elected **Gordon D. Skinner** and **Carl S. Ablon** vice presidents. Mr. Skinner is located in the Detroit district while Mr. Ablon is located in the Cleveland district.

Climax Molybdenum Co., New York, elected **Weston G. Thomas** executive vice president, **Frank Coolbaugh** vice president-western operations, **Alvin J. Herzig** vice president-research, **Wallace Macgregor** treasurer and **George P. Fillius** assistant treasurer. **Carl M. Loeb Jr.** resigned as vice president in charge of sales and research but remains a director and chief technical adviser.

Arch J. Cochrane succeeds **B. M. Stubblefield** as Chicago district manager in charge of plant opera-

GORDON D. SKINNER

CARL S. ABLON

. . . vice presidents of Luria Bros. & Co.

How we opened the door to lower costs for Ford

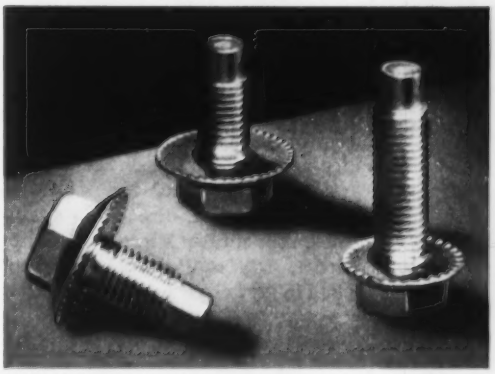
Two hinges on every Ford door. Six screws and 12 washers for each hinge.

Did this present an opportunity for cost reduction? An RB&W "fastener engineer" thought so. And after careful analysis and time studies Ford engineers agreed.

The solution: RB&W Hex SPIN-LOCK screws to fasten the hinge to the door, eliminating the need for washers. And special wide-flange Hex SPIN-LOCK screws for attaching the hinge to the frame, doing away with more washers. The wide flange is necessary to cover an elongated hole in which the hinge moves to permit accurate alignment.

Result — parts requirements are cut by two thirds, assembly is simplified, purchasing and inventory costs are lowered. And RB&W SPIN-LOCK screws hold those door hinges tight for good.

We will be glad to send an RB&W man around to check up on your fastening operations. Every problem is different, of course, but RB&W has a fastener for just about every job. If you need a "special", as Ford did, we'll design and make it for you. Write RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY, Port Chester, New York.



FASTER ASSEMBLY, reduced costs were the pay-off, using RB&W designed wide-flange SPIN-LOCK screws (left) for door hinge. Other SPIN-LOCKS (right) hold hinge on door. SPIN-LOCK screws *can't loosen* because ratchet-like teeth lock into surface and hold tight.

3.10

RB&W

109 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

Plants at: PORT CHESTER, N.Y.; CORAOPOLIS, PA.; ROCK FALLS, ILL.; LOS ANGELES, CALIF. *Additional sales offices at:* ARDMORE (PHILA.), PA.; PITTSBURGH; DETROIT; CHICAGO; DALLAS; SAN FRANCISCO. *Sales agents at:* PORTLAND, SEATTLE. *Distributors from coast to coast.*

R. E. PRICE
. . . Gardner Machine gen. mgr.

THOMAS E. MILLSOP
. . . president of National Steel

tions of **Youngstown Sheet & Tube Co.** Mr. Stubblefield continues as a consultant.

Gardner Machine Co., Beloit, Wis., named **R. E. Price** general manager. Prior to joining the company in 1952, Mr. Price was with Landis Tool Co. for 23 years. **Russell L. Dustman Jr.** was made manager of the machinery sales office in Richmond, Ind., and **John E. Schobinger** was named manager of the machinery division's Detroit sales office.

J. T. Foerth, controller and a director, was elected a vice president of **Bassick Co.**, Bridgeport, Conn., a subsidiary of Stewart-Warner Corp.

R. R. Jenner, former chief radio and electronics engineer for Beech Aircraft Co., was appointed to the newly created post of director of airborne products for **Micro Switch**, Freeport, Ill., a division of Minneapolis-Honeywell Regulator Co.

Thomas E. Millsop, president of Weirton Steel Co., was elected to succeed **George R. Fink** as president of the parent company, **National Steel Corp.**, Pittsburgh. Mr. Fink, who retires from active management as president of National Steel and also as president of its Detroit subsidiary, Great Lakes Steel Corp., will continue in a consulting capacity with Great Lakes as chairman of the board and also continues as a director of National Steel. **Paul Carnahan**, vice president and assistant to the president of Great Lakes Steel Corp., was elected senior vice president of that company.

Westinghouse Electric Corp. elected as vice presidents: **Walter J. Maytham**, San Francisco, Pacific Coast regional manager for its apparatus divisions; **Dale McFeatters**, Pittsburgh, director of information services for the corporation; and **Otis O. Rae**, Atlanta, southeastern regional manager, apparatus divisions. **E. V. Huggins**, New York, vice president-corporate affairs, was also named secretary of the corporation to succeed **C. W. Pomeroy**, retired.

William F. Sauers has become associated with Jerome J. Theobald, sales engineer, Skaneateles, N. Y., in promotion in western New York and Erie county, Pa., of sales of products of Mt. Vernon Die Casting Corp., Stamford, Conn.; Winsted Division, Hudson Wire Co., Winsted, Conn.; Gries Reproducer Corp., New Rochelle, N. Y.; and Davidson Rubber Co., Boston. Mr. Sauers was associated with Ritter Co. Inc., Rochester, N. Y., as purchasing agent.

Dwight W. Kaufmann was made eastern sales manager and **George T. Fraser** western sales manager of **Rem-Cru Titanium Inc.**, newly created positions. Mr. Kaufmann, who will have headquarters in Midland, Pa., joined Rem-Cru in 1953 as assistant sales manager when he transferred from the central metallurgical office of Crucible Steel Co. of America, co-owner of Rem-Cru with Remington Arms Co. Mr. Fraser formerly served as sales manager, located at Midland. He now has headquarters in the newly established Los Angeles office. In addition he will be western area sales manager for Crucible.

Frank F. Hines was named executive vice president and director of engineering for **Ruge-deForest Inc.**, Cambridge, Mass. **Haskell Ginns** was elected vice president in charge of electronics, **Edgar J. Jones** vice president in charge of sales and **Arthur F. Myette** comptroller and assistant to the president. **S. Richard Childerhose**, formerly with Norden Co., was made works manager.

OBITUARIES . . .

Prescott H. Walker, 59, assistant vice president, **Carborundum Co.**, Niagara Falls, N. Y., and acting director of manufacturing, died Apr. 29.

Wilbur V. Paine, 78, director of research for **Spencer Turbine Co.**, Hartford, Conn., died Apr. 18. Identified with the firm 52 years, he held the title of chief engineer.

Loring P. Crossman, 61, electronic engineer with **Remington Rand Inc.**, New York, assigned to the business computer, died Apr. 11.

G. T. Van Alstyne, 62, director of advertising and publicity, **Air Reduction Co. Inc.**, New York, died Apr. 21.

Werner H. C. Berg, director of research, **Whitney Chain Co.** and Hanson-Whitney Division, Hartford, Conn., died Apr. 21.

Frank S. O'Reilly, 67, one of the founders of **High Standard Mfg. Co.**, Hamden, Conn., died Apr. 25.

Henry N. Vreeland, 51, assistant director of purchases for **Remington Rand Inc.**, New York, died Apr. 30.

Lakey Foundry saves 112 man-hours per shift in core handling with three 2000-lb. Clarks

Handling finished cores, from baking ovens either to core storage or direct to the molding line used to require 23 men using hand dollies; and stacking was done manually. Now, says Jim Wilson, Methods Engineer, three operators on Clark 2000-lb. trucks with six helpers, do a far better job with a reduction of 112 man-hours per 8-hour shift. "That's nice money!" is Jim Wilson's understatement.

Foundries are a particularly "happy hunting ground" for cost-minded executives armed with Clark fork trucks: on the alert for faster, safer, cheaper ways to handle sand, scrap, cores, molds, castings—all the many handling jobs that make up a foundry's production cycle.

How about some good hunting in your own plant? There's an expert guide available — the Clark dealer: thoroughly competent to analyze your materials handling needs and to devise a plan to satisfy them. He's listed in your directory's Yellow Pages.

HOW LAKEY USES THREE CLARK TRUCKS

Production:	10,000 cores per day from 4 core lines and 4 ovens; grey iron castings chiefly for engine blocks and housings for industrial, agricultural and earth-moving machinery.
Sizes & Wts.:	10"-30" high, cores 12 to 100 lbs. each.
Handling Equipment:	3 Clark 2000-lb. trucks, 36" x 48" plywood and metal pallets, hydraulic load stabilizers with 1" sponge-rubber facing, to hold cores firmly and compensate for varying heights.
Unit Loads:	range from 800 lbs. to 1600 lbs.
Storage:	Palletized units tiered to 15 ft. height; neat rows conserve storage space, simplify removal of cores, promote good-housekeeping.

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 26, Michigan

CLARK EQUIPMENT

new hob list

CUTTERS · BROACHES · SPECIAL TOOLS

...to help you engineer the gears you need

BRAD FOOTE GEAR WORKS, INC.
CICERO 50, ILLINOIS

56-page Catalog *of tools for making*

WORMS
WORM GEARS
HERRINGBONE
SPUR
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RACKS
ACME SCREWS
SPROCKETS
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KEYWAYS

Here's the Way You Can Save Money on Gears

During the many years BRAD FOOTE has been making gears, we have accumulated a large variety of hobs, cutters, and broaches which we have used to make thousands upon thousands of gears to order. With this stock of tools, we are able to do just about any gear cutting job you may have.

By laying out your gears to be made with these tools, you can get what you need quicker . . . and cheaper

Write today on your company letterhead for a free copy of this big catalog which shows all the important specifications needed by gear designers. You'll find it convenient to use, and it will save you money on the gears you buy.

IMPORTANT NOTE: *If you now make your own gears, ask for a copy anyway. You may find that it is cheaper for us to make them.*

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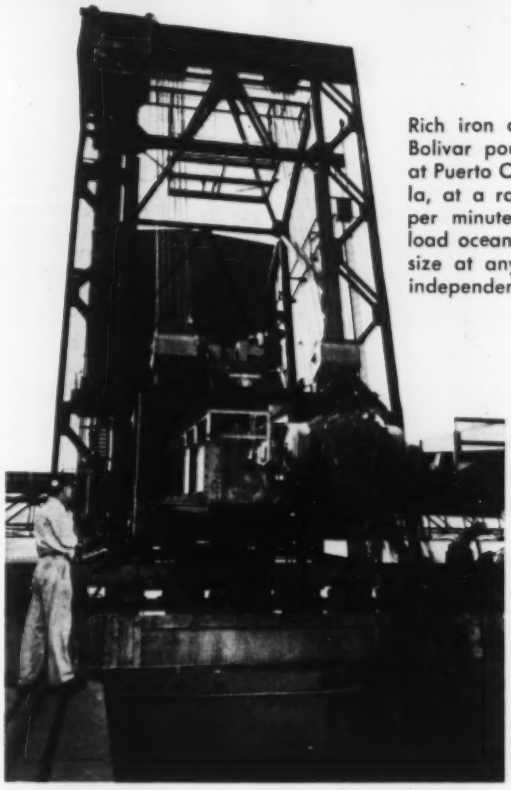
PITTSBURGH GEAR COMPANY • Phone: SPaulding 1-4600 • Pittsburgh 25, Pennsylvania

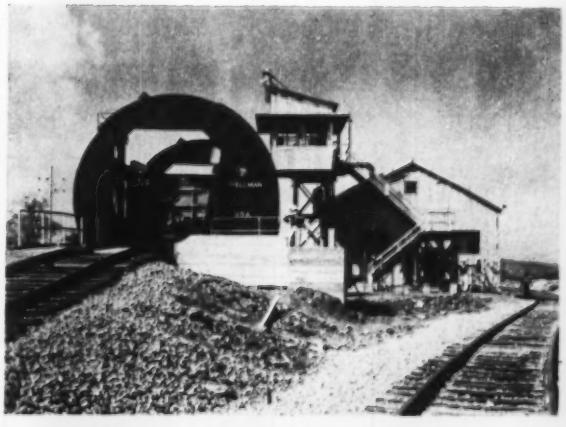
Link-Belt-Designed System Speeds Ore From Cerro Bolivar

DURING 1954 Orinoco Mining Co. expects to ship 2 million tons of ore mined at Cerro Bolivar, U. S. Steel Corp.'s fabulous Venezuelan mountain of iron. From the time the ore arrives in hopper cars at Puerto Ordaz on the Orinoco until it enters ships bound for U. S. Steel's Fairless Works, an ore-handling system designed by Link-Belt Co., Chicago, takes over.

Included in the system are car dumpers, primary and secondary crushers, machinery for reclaiming ore from storage, a huge ship loader and long interconnecting belt conveyors that are expected eventually to handle 10 million tons of ore a year.

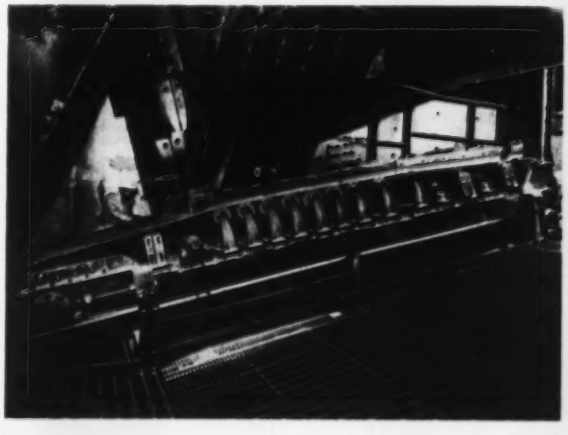


Rich iron ore from Cerro Bolivar pours into a ship at Puerto Ordaz, Venezuela, at a rate of 100 tons per minute. Loader can load ocean vessels of any size at any time of year independent of river level



First unit in ore crushing-storing-loading sequence is Wellman rotary railroad car dumper which every hour can dump 69 carloads, each weighing 90 tons

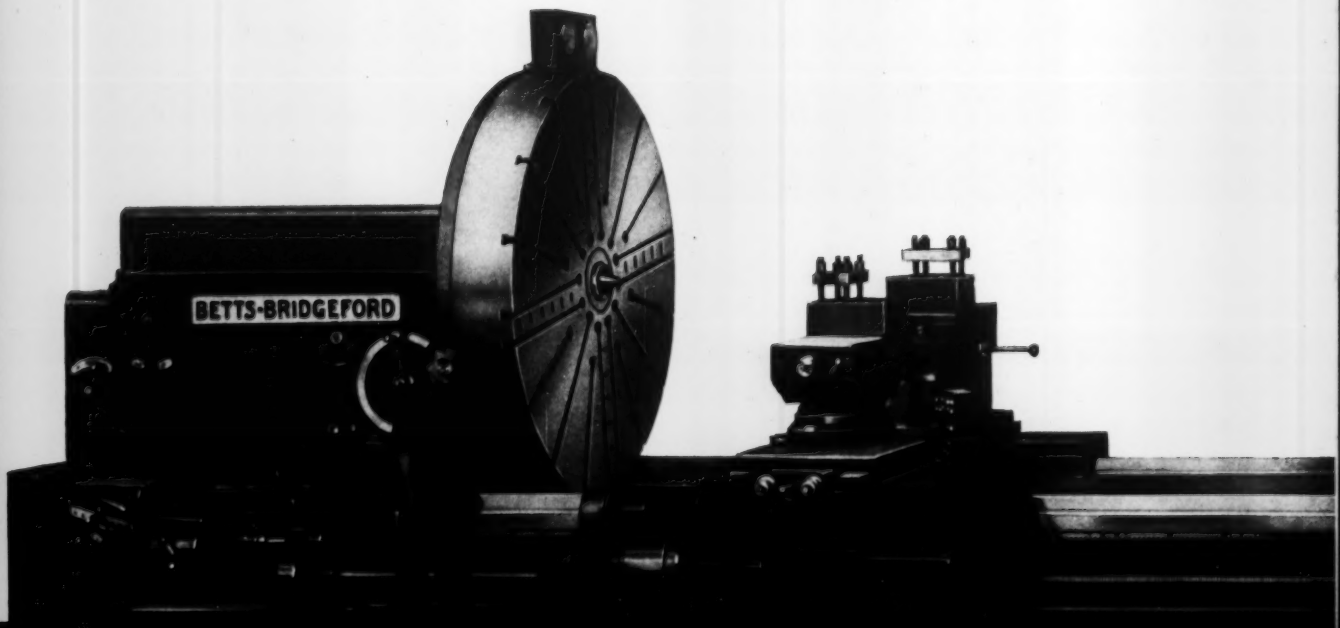
Each second almost 20 tons of iron ore stream along this belt conveyor to 65-foot-high, self-propelled shiploader which can be positioned at any point along loading dock



Wear on main conveyor belts by ore plunging from crusher hoppers is kept to minimum by short transfer belts, rubber-cushioned to absorb the shock

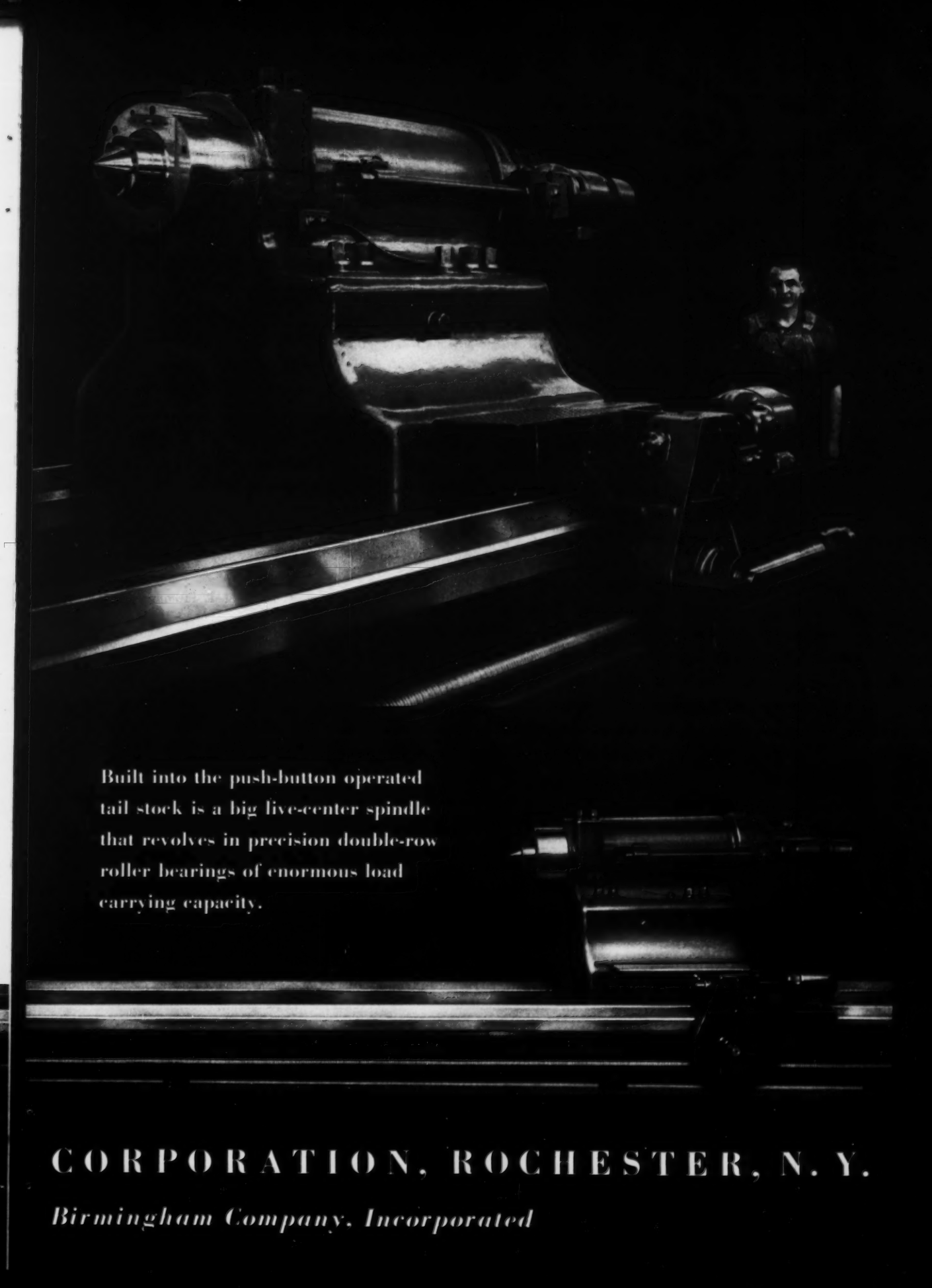
Another Big One!

A 96 Inch Heavy-Duty Betts-Bridgeford Lathe for the precision turning of forged steel steam turbine shafts weighing up to 90 tons!



CONSOLIDATED MACHINE TOOL

Wholly owned subsidiary of Farrel-



Built into the push-button operated tail stock is a big live-center spindle that revolves in precision double-row roller bearings of enormous load carrying capacity.

CORPORATION, ROCHESTER, N. Y.

Birmingham Company, Incorporated

Ryerson Builds in Detroit

Structure on Seven Mile road will house firm's Concrete Reinforcing Steel Division

CONSTRUCTION is under way at 6500 Seven Mile Road, Detroit, for a building to be occupied by the Concrete Reinforcing Steel Division of Joseph T. Ryerson & Son Inc., Chicago. The new unit, which will operate as a branch of this warehousing organization's main Detroit plant at 1600 E. Euclid Ave., is expected to be completed this summer.

C. L. HARDY
. . . president of Ryerson

The enlarged reinforcing steel operation will have about 26,000 sq ft of working and storage space in the 110-ft by 240-ft mill-type craneway building. Complete equipment for fabricating reinforcing bars to specifications, including shearing and bending machines, will be installed.

Larger Inventory — Ryerson's present plant in Detroit was enlarged by about 40 per cent in 1930. Transfer of the reinforcing operations will free valuable space in the Euclid avenue plant which will be used to expand the firm's stock of other steel products.

Heading the company's reinforcing steel operations at Detroit is William G. Murray, who moved up to the post of department manager in 1953 after 15 years in the Reinforcing Steel Division at the firm's Chicago plant. His headquarters will remain at 1600 E. Euclid Ave., Detroit.

The contractors' services available through the division include the furnishing of plain and fabricated H-bond reinforcing bars, electric-welded wire fabric, steel spirals, reinforcing accessories, expanded metal, and steel forms. Reinforcing bar setting plans are drawn, the steel is cut and bent to specifications, all bars are tagged with an identification number for quick placement, and deliveries are timed to the progress of the job, Mr. Murray says.

C. L. Hardy, Ryerson president, disclosed that the company has plans to locate its entire Detroit operation at the new site eventually. E. M. Vehmeyer is manager of the Detroit plant.

Federal Enters Package Field

Federal Mfg. & Engineering Corp., Brooklyn, N. Y., formed a Transit Case Division which will be devoted to production of transit cases to rigid military specifications. They are made of plywood and aluminum and are equipped with rubber mounts.

Republic Licenses Italian Firm

Republic Steel Corp., Cleveland, licensed Fiat of Turin, Italy, to produce Enduro stainless steels and heat-resisting steels in all grades at its plant in Turin for distribution in Italy. Republic will provide engineering and technical talent to assist in laying out and installing the steelmaking facilities together with metallurgical engineers and rolling mill personnel as may be necessary to provide technical assistance.

SPS Completes Project

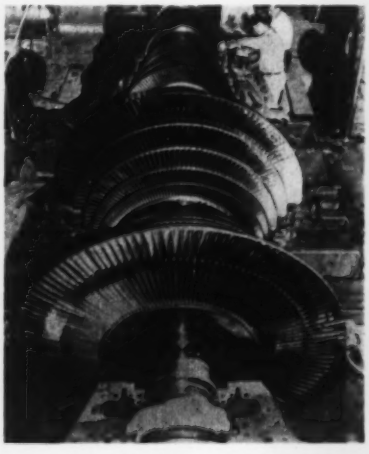
Standard Pressed Steel Co., Jenkintown, Pa., completed a $10-million phase of a continuing program of expansion and modernization under which the firm has doubled its floor space to 650,000 sq ft in the last four years. This producer of socket screw products plans further expansion of plant facilities. In addition to a new plant building, SPS installed a plant-wide, high-voltage electrical distribution system, more than half a mile of mechanical conveyors, a central scrap-handling machine that pulverizes metal turnings, a $1-million plating operation, including a $200,000 waste treatment plant.

CF&I May Improve Rod Mill

Officials of Colorado Fuel & Iron Corp., Denver, are considering a proposal to spend $2.5 million for improvement of the rod mill at Tonawanda, N. Y., operated by its Wickwire Spencer Division.

Alcoa Dedicates Texas Plant

Aluminum Co. of America, Pittsburgh, dedicated its new four-potline Rockdale Works, Rockdale, Tex. This adds 90,000 tons annually to the nation's aluminum-smelting capacity and brings the total capacity of aluminum-producing plants in Texas to about 260,000 tons annually, or about one-sixth of the nation's total. Texas now ranks second among aluminum-producing states. The accompanying picture shows a turbine rotor being assembled in one of the



generating units of the Sandow plant which supplies power for Rockdale operations. The plant, situated adjacent to the smelting facilities, generates power by burning lignite as fuel.

Machinery Firm in Merger

H & B American Machine Co., Chicago, merged with Susquehanna Mills Inc., New York, forming H & B American Machine Co. Inc. Officers of the new firm are Victor Nemeroff, president; A. H. Maremont and D. E. Bright, vice

CONTROLLED SPEED—

A DISTINCTIVE FEATURE OF ALL-

Vaughn MOTOBLOX®

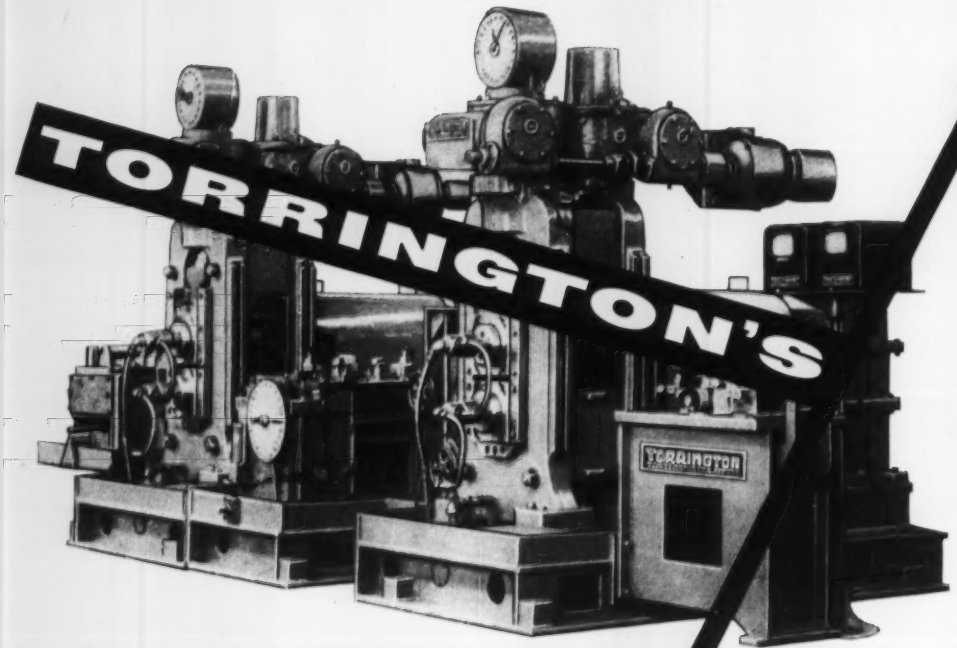
The speed of each block is AUTOMATICALLY controlled to meet the preset speed of the finishing block—thereby eliminating SLIP and accumulation of wire on intermediate blocks.

The Vaughn MOTOBLOX is a truly non-slip machine – check the facts with a Vaughn engineer!

"Quick on the Draw!"

THE VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.



HIGH SPEED FLAT WIRE MILLS

These high-speed Torrington units are designed to roll flat wire at high production rates. Available in a wide variety of sizes with automatic controls, they provide maximum flexibility. Combinations of two or three flattening stands together with edgers accommodate a great variety of work. Handles 4,000 lbs. weight at entry, up to 1,000 lbs. on winder, with speeds as high as 3500 FPM and more. All operations can be performed by power—pneumatically, hydraulically or by electric motor—under operator's control at a main pulpit or at control stations advantageously located. Write or call for further information.

TORRINGTON

MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT

presidents. H & B operating divisions are Midwest Division, maker of parts for aircraft and related industries; Karp Metal Products Division, producer of precision sheet metal products; and Octigan Division, operator of a foundry for drop forgings. Susquehanna is engaged in the general manufacture of textiles.

Duplex Inc. Buys Acme Sash

Duplex Inc., Los Angeles, purchased the inventory, fixed assets, patents and name of Acme Sash Balance Co., that city. Earl M. Pollard will continue as general sales manager for Acme Sash Balance Co. as a division of Duplex.

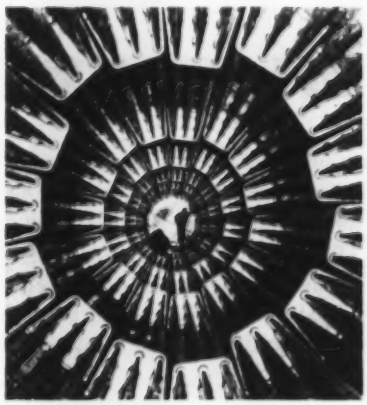
Convair, Dynamics Merge

Consolidated Vultee Aircraft Corp., San Diego, Calif., merged with General Dynamics Corp., Groton, Conn. Convair is manufacturing commercial and military aircraft, while General Dynamics holds a Navy contract for atomic-powered submarines.

Armco To Conserve Water

Armco Steel Corp., Middletown, O., will begin construction soon on a $1,250,000 project at its East Works plant which will help greatly to conserve the water resources

(*Please turn to page* 108)

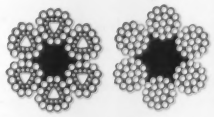


King-sized Aluminum Oven

Carload of Alcoa aluminum—35,000 lb—goes into 100-ft-long, 10-ft-diameter Louisville steam tube dryer made by General American Transportation Co., Chicago. These dryers are especially suited for fine solids such as rubber fillers and pigments

PROVING EXTRAORDINARY SERVICE—A Hercules Flattened Strand crane rope delivered 18 months service, compared to 6 months for ordinary rope. It performed equally well as a clamshell bucket rope. On a hot ladle crane it outlasted round strand rope by 4 to 1. It was chosen for its super strength to haul the car on the continent's largest cableway at Kitimat.

Can Flattened Strand solve your special wire rope problem?



Flattened Strand Round Strand

Hercules Flattened Strand is a special kind of wire rope that provides extraordinary service on special kinds of jobs.

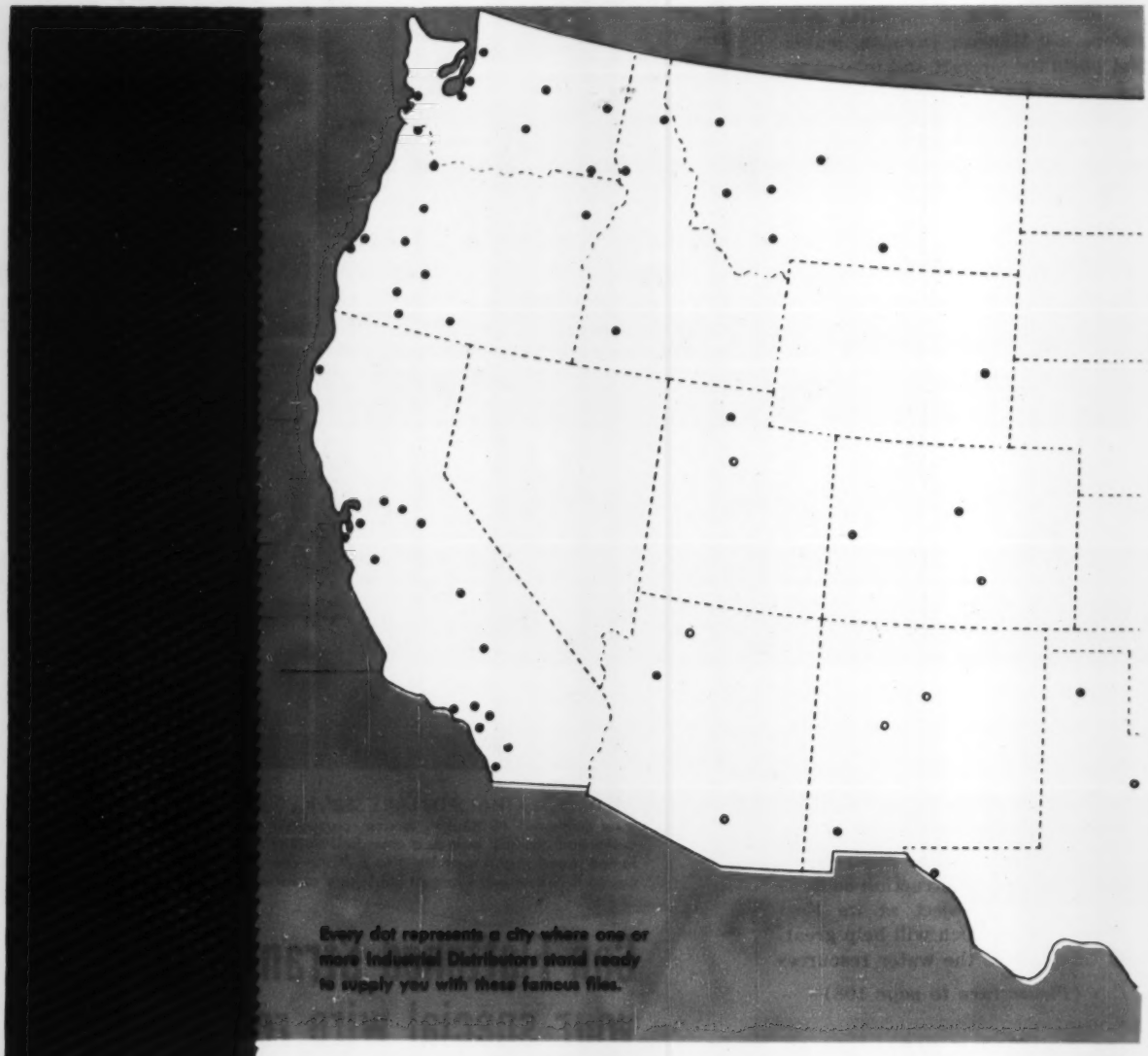
The key to the difference is the triangular shape of the strands. Notice how the strands support each other; how the rope circumference is almost perfectly round; and how the core is smaller. There is 10% more steel in Hercules Flattened Strand than in round strand ropes of the same diameter. That means *10% more strength* and *10% greater safety*. Flattened Strand wears longer and more evenly...and is easier on sheaves and equipment.

If you can use this Super-rope, you'll soon begin saving time, labor, money. Why not investigate?

Because Leschen pioneered and perfected Hercules Flattened Strand wire rope, Leschen is your best source of additional information. Ask your Leschen man, or write for "The Flattened Strand Story."

LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri

LESCHEN
WIRE ROPE


Every dot represents a city where one or more Industrial Distributors stand ready to supply you with these famous files.

A DISTRIBUTION SERVICE

Nicholson and Black Diamond files are handled by one of the largest and most widespread groups of Industrial Distributors serving American industry.

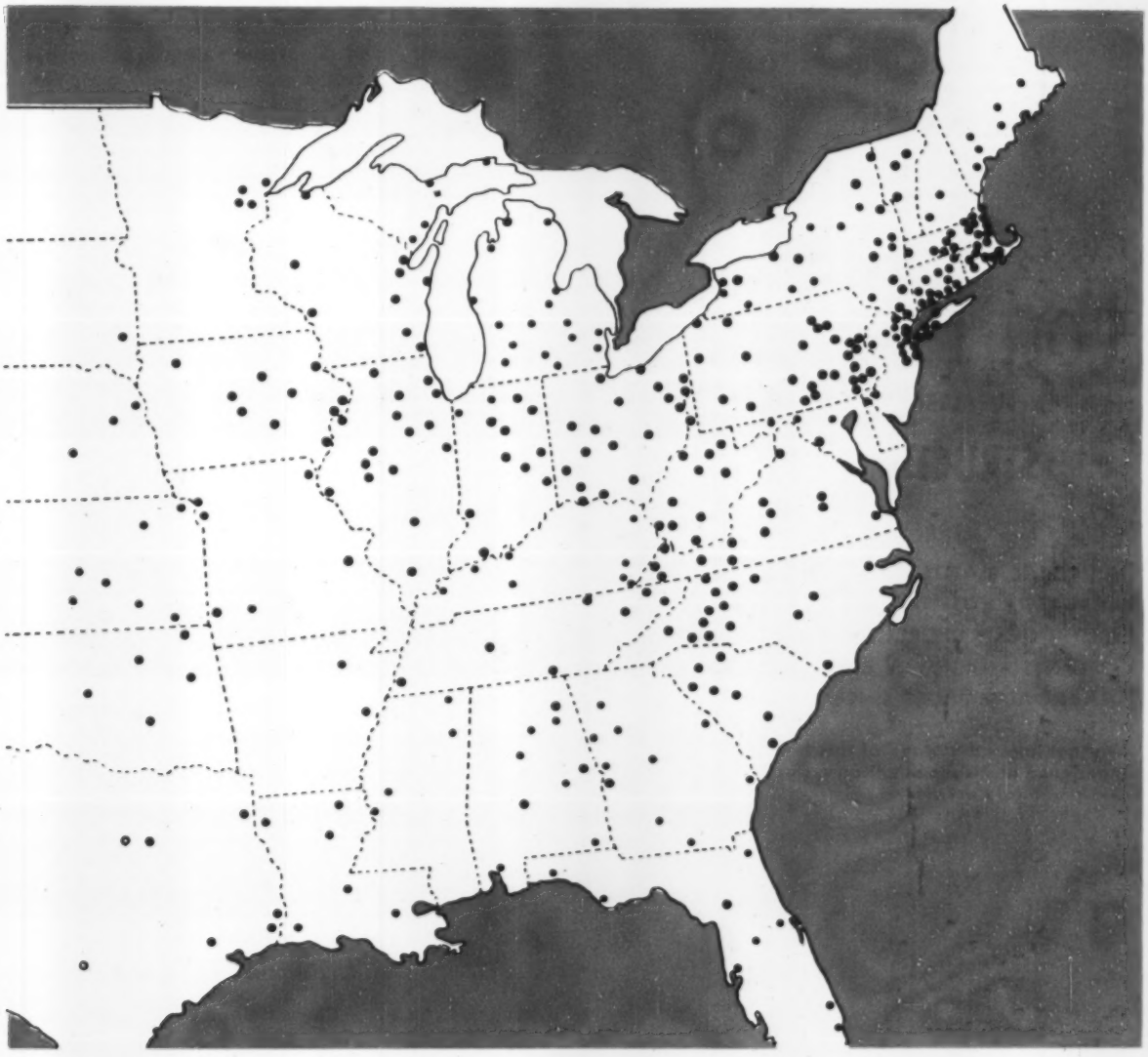
They can serve you no matter where you are located.

To you managing, purchasing and production heads, Nicholson and Black Diamond distribution is measured in terms of *Availability*, *Knowledge* and *Facilities:*

1. There are Nicholson and Black Diamond distributors in the 396 cities indicated above—a complete network.

2. They are all high-type distributors with well-trained, competent salesmen.

NICHOLSON



THAT COVERS THE NATION

Thus the Nicholson and Black Diamond distributor representative serving you is a useful technical consultant instead of just an order taker.

3. They have the means for maintaining good stock assortments.

4. They have efficient delivery facilities.

5. They rate high in intimate knowledge of the file requirements for different industries, different metals, different shop operations.

Nicholson products include every practical shape, cut and size in Regular Purpose, Special Purpose, Saw, Milled Curved Tooth, Swiss Pattern and Rotary files—the largest aggregate in existence.

NICHOLSON FILE COMPANY

PROVIDENCE 1, R.I.

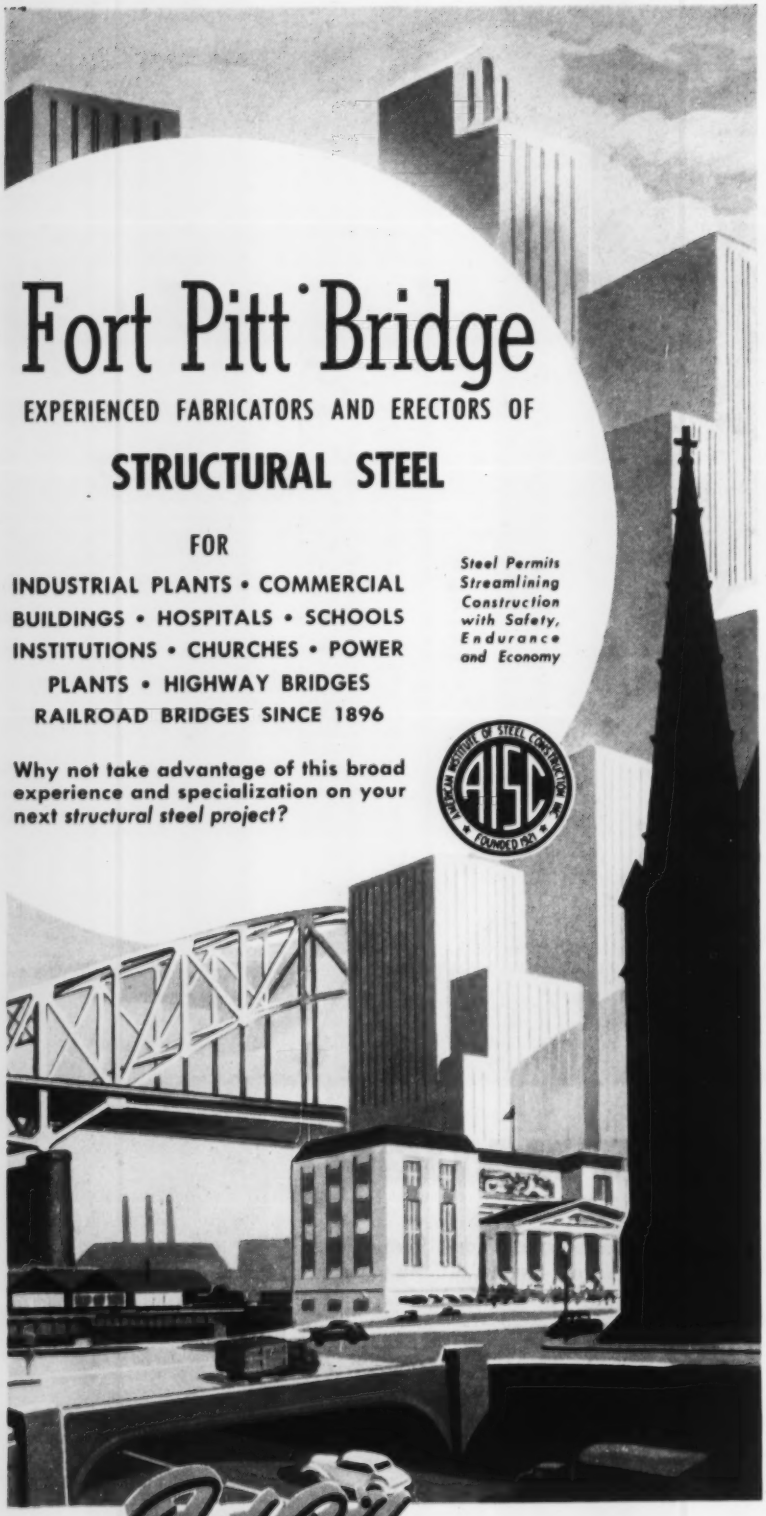
(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

NICHOLSON U.S.A.

BLACK DIAMOND MADE IN U.S.A.

...A FILE FOR EVERY PURPOSE

A DISTRIBUTOR FOR EVERY USER


Fort Pitt Bridge
EXPERIENCED FABRICATORS AND ERECTORS OF
STRUCTURAL STEEL
FOR
INDUSTRIAL PLANTS • COMMERCIAL
BUILDINGS • HOSPITALS • SCHOOLS
INSTITUTIONS • CHURCHES • POWER
PLANTS • HIGHWAY BRIDGES
RAILROAD BRIDGES SINCE 1896
Steel Permits Streamlining Construction with Safety, Endurance and Economy
Why not take advantage of this broad experience and specialization on your next structural steel project?
AISC
FOUNDED 1921
Fort Pitt BRIDGE WORKS
Member American Institute of Steel Construction
General Offices, PITTSBURGH, PA. • Plant at CANONSBURG, PA.
District Offices:
NEW YORK, N. Y. • CLEVELAND, OHIO • DETROIT, MICHIGAN

(*Continued from page* 105)

of the Miami valley. The new system is expected to save more than 10 million gallons of water per day.

Chemical Firm Expands

Cornwell Chemical Corp., Cornwells Heights, Pa., has completed an expansion program for the company's sulphuric acid producing facilities.

Bedell Is Sole Owner of Rand

Bud Bedell is now sole owner of Rand Steel Corp., Detroit. The firm will continue to warehouse hot and cold-rolled sheets, strip and coil and will continue to offer shearing, slitting and storage services.

REPRESENTATIVES

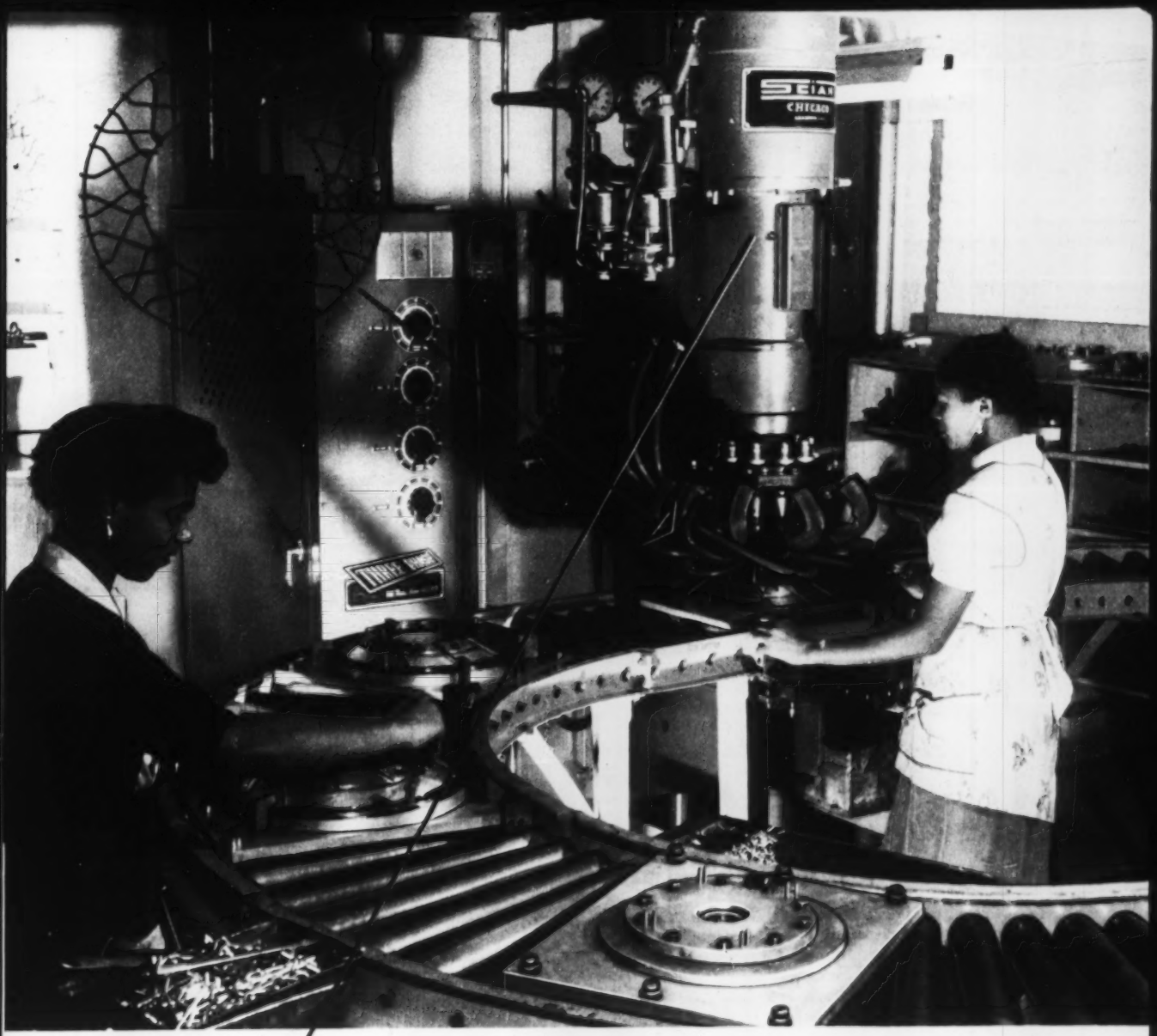
General Electric Co.'s Carboloy Department, Detroit, appointed Alden Supply Co. Inc., Philadelphia, as distributor of its standard cemented carbide tools and blanks, carbide-tipped masonry drills and diamond wheel dressers.

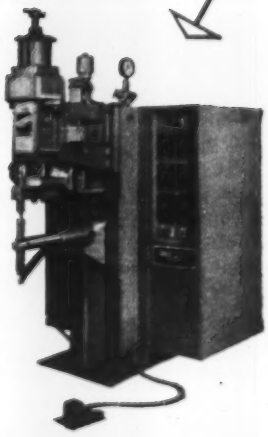
Lichtenberger Bros., Chicago, were named distributors by **Cleco Pneumatic Tool Division, Reed Roller Bit Co.,** Houston. Cleco makes air-powered tools and accessories.

Clark Equipment Co., Buchanan, Mich., appointed United Tractor & Equipment Corp., New York, as distributor of the Michigan line of power shovels and tractor shovels, products of its Construction Machinery Division. Clark also appointed Michigan Machinery & Equipment Co., St. Joseph, Mich., a newly organized firm, as its western Michigan distributor for those products.

J. C. Renfroe & Sons Inc., Jacksonville, Fla., manufacturer of steel lifting clamps, opened an eastern office in charge of James Easter. Known as Renfroe Sales Division, its mailing address is P. O. Box 114, Merchantville, N. J.

Annin Co., Los Angeles, maker of valves and other process equipment, appointed Ward K. Stallings Co., Atlanta, as its representative in Georgia, eastern Tennessee and





Two Standard Sciaky Three-Phase Welders Join 42 Parts in Over 1,000 Assemblies per Day

COMPLEX simulated wire wheels for automobiles are mass produced at Casco Products in Bridgeport, Conn. Only two standard Sciaky patented Three-Phase welders adapted with multiple gun tooling are used. No skilled workers are required to join 40 spokes of .430 stainless steel to the two retainer rings in only four operations.

Standard Sciaky welders eliminated cost of expensive special machines. Sciaky Three-Phase suited Casco's limited power facilities, where conventional single phase could not. Sciaky Three-Phase consistency of operation satisfied rigid inspection of alignment and set-down of welds to insure positive fit, and provided smooth fillet welds eliminating special finishing. For complete details, write for R.W.A.W. Vol. 3, No. 9.

Resistance welding of Casco wire wheels is another fine example of Sciaky's basic thinking—welders designed for *more useful work* at *lowest operating cost* with *maximum reliability.*

Largest Manufacturers of Electric Resistance Welding Machines in the World

SCIAKY

4909 West 67th Street, Chicago 38, Illinois

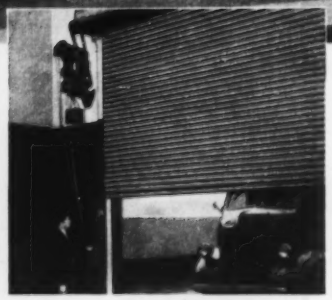
Interlocking steel-slat construction assures extra protection and longer life at lower cost*

Kinnear Steel Rolling Doors

Smooth coiling upward action makes all floor and wall space fully usable at all times

With Kinnear Rolling Doors, all overhead space remains clear for hoist, crane or conveyor equipment or other superstructure. No floor or wall space is lost *inside or outside* of Kinnear Rolling Doors because they open straight upward. Light from overhead fixtures is never obstructed.

Kinnear Rolling Doors coil compactly, directly over the door lintel. Edges of the steel curtain are securely anchored in tracks from floor to lintel, insuring secure closure and extra protection against fire, intrusion and the elements. Kinnear's smooth upward action assures easy manual lift, chain or crank operation, and is ideal for time-saving electric control, using Kinnear Motor Operators with push-buttons at any number of convenient points. Kinnear Rolling Doors are built any size . . . easily installed in old or new buildings. Write today for full details.



*DOUBLE PROTECTION AGAINST THE ELEMENTS

Kinnear Steel Rolling Doors are heavily galvanized (1.25 oz. of zinc per sq. foot, as per ASTM standards) to provide a long-lasting weather-resistant surface. In addition Kinnear Paint Bond, a special phosphate application, provides for easy, thorough paint coverage and lasting paint adhesion.

Records show that many Kinnear Rolling Doors have been in continuous service for 20, 30 and 40 years.

KINNEAR ROLLING DOORS
Saving Ways in Doorways

The KINNEAR Manufacturing Co.
FACTORIES:
1780-1800 Fields Avenue, Columbus 16, Ohio
1742 Yosemite Ave., San Francisco 24, Calif.
Offices and Agents in All Principal Cities

northern Alabama; and Frank A. Thomas Co., Spring Hill, Ala., as its representative in southern Alabama, western Florida and eastern Mississippi.

Safety Tool Division, Ampco Metal Inc., Milwaukee, appointed Max Weiss Co., that city, and Persingers Inc., Charleston, W. Va., as distributors of its safety tools. Ampco also appointed Welding Supply Co., Charleston, W. Va., and Aweco Supply Co., Tucson, Ariz., as distributors for its weld-rod products; and Mehl Machinery Inc., Houston, as distributor for its full line of resistance welding electrodes and accessories.

ASSOCIATIONS

Nelson S. Hibshman was elected secretary of **American Institute of Electrical Engineers**, New York, succeeding H. H. Henline. Elgin B. Robertson is president of this technical society.

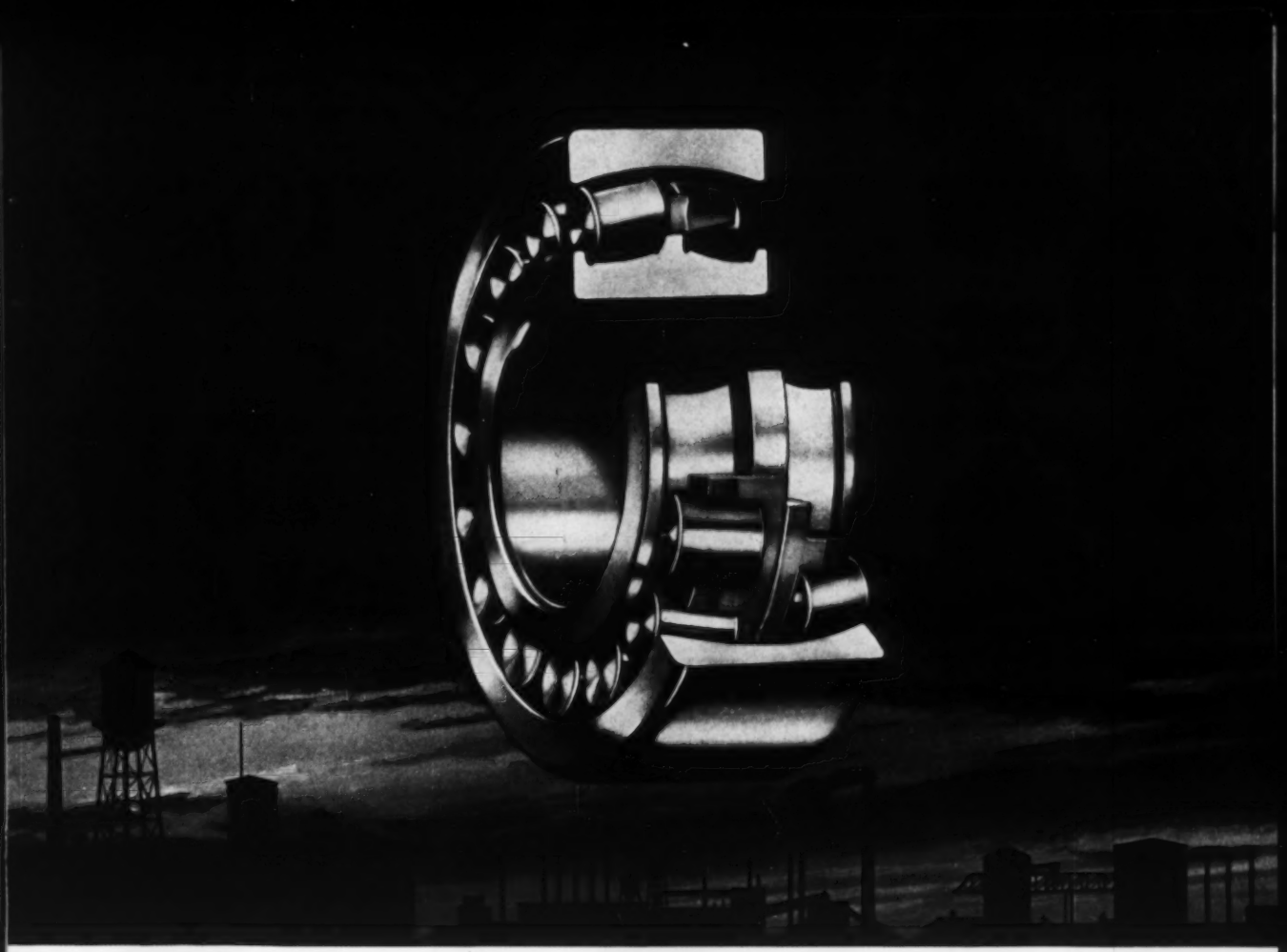
NEW ADDRESSES

Metallurg Inc., Metallurg Ore Corp. and **Metallurg Export Corp.** moved their offices to 99 Park Ave., New York.

All facilities of **Tempil Corp.**, including office and shipping departments, are consolidated at 132 W. 22nd St., New York. Only the plant and laboratory of the firm were located previously at that address.

Harris Tube Inc. will open a factory at 8720 S. Pedro St., Los Angeles, for manufacture of electric welded steel tubing. Clarence D. Harris is president.

Tenney Engineering Inc. is carrying on full-scale operations in its new plant at 1090 Springfield Rd., Union, N. J. The plant consolidates and enlarges previous facilities of its main plant at 26 Avenue B and an auxiliary plant at 68 Clifford St., both in Newark, N. J. The plant will be devoted exclusively to the manufacture of environmental equipment.



Why it pays to specify
TORRINGTON Spherical Roller Bearings

Uniform, close control of precision-ground contact surfaces—for even load distribution, maximum bearing life.

Accurate geometrical conformity between races and rollers—for ultimate capacity and performance.

Races and rollers heat treated according to the most advanced metallurgical procedures.

Machined, cast-bronze cages—one for each path of rollers—assure freedom of operation.

Integral center flange on inner race—to give positive radial and thrust stability—both essential to satisfactory performance.

Available from stock with either straight or tapered bore—for shaft or adapter mounting.

These are advantages that give you long, efficient, low-maintenance service in the toughest heavy-duty applications... **maximum value for your bearing dollar.** *That's why it pays to specify TORRINGTON Spherical Roller Bearings.*

THE TORRINGTON COMPANY
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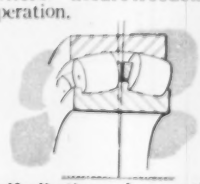
TORRINGTON SPHERICAL ROLLER **BEARINGS**

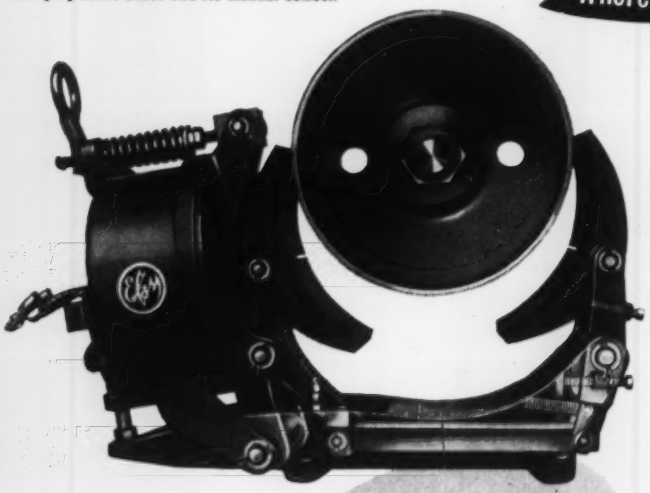


Self-aligning—for continuous, free-rolling service under shock loads and at sustained speeds.

Unit assembly—for easy, low cost handling.

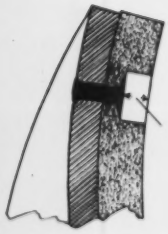
Spherical Roller • Tapered Roller • Cylindrical Roller • Needle • Ball • Needle Rollers

Type WB Brake showing how the motor armature is easily lifted out. At top left is the handle-nut for compressing the spring when removing motor armature, changing brake shoes and for manual control.



Long Life Brakes for A-C and D-C Motors by EC&M

The brake lining is molded to match curvature of wheel and shoe.

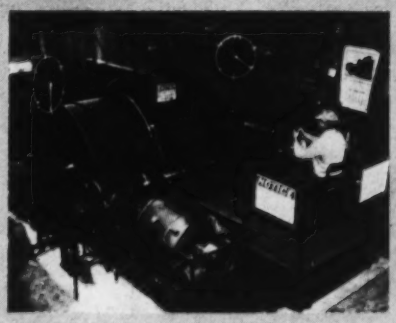


Actual wearing thickness, between rivet heads and brake wheel, is 1/4" on the smallest size to 7/16" on the largest size.

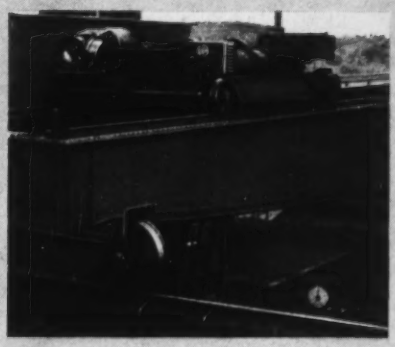
These Type WB Brakes use a block type lining which is both thick and tough.

Furthermore, due to the process of manufacture, the blocks have proper frictional quality *throughout the entire thickness* permitting uniform and complete wear down to rivet heads. And since the material is non-compressionable, brake adjustments are infrequent.

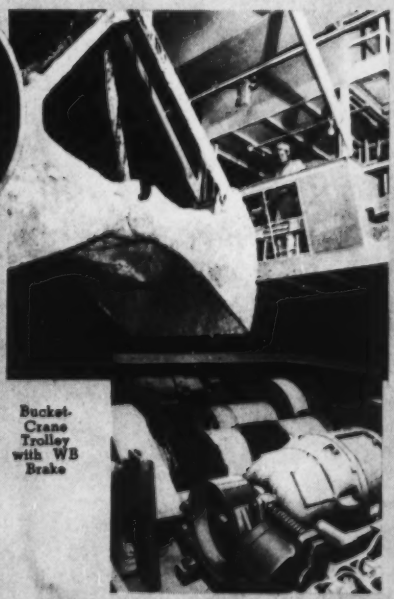
Where You Will SAVE With WB Brakes



A-C Mine-Hoist Motor with WB Brake



Reduces Delays on Foundry Crane



Bucket-Crane Trolley with WB Brake

WRITE FOR COMPLETE FACTS—Ask for No. 18 ACCELERATOR Bulletin

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79TH STREET • CLEVELAND 4, OHIO

Plan For Profit With

IMPROVED METALS

CONTINUED "austerity" in the face of "general availability" is the big news in basic materials today.

To reconcile the apparent contradiction, you must look at what has been happening the past several years. As one man sees it:

" . . . competition for materials must be met in only one way: We must use the unique characteristics of each material in the best possible manner."

That observation was made in 1953, not 1954. Another expert, speaking this year, rounds out the picture:

One of the interesting developments, he points out, has to do with the close technical co-operation of suppliers and users. "While high-quality materials are a paramount requirement," he concludes, "a good part of the success depends upon intelligent application."

In the light of continued conservation, what do the two statements imply?

Just this: The "shortage and restriction" philosophy of careful selection and application is being carried over into a period of plenty.

Suppliers are selling and users are buying properties, not materials per se.

This departure from the "buy cheap and save" line of thinking is of great significance.

Suppliers and users should be congratulated for having the courage and foresight to permanently adopt the "long view." For it certainly seems to be a sound approach to the continued good health of our economy.

Caterpillar

The Case For

BLUE RIBBON STEELS

When you are sure you need a "special," you look beyond "first costs" and buy such properties as through-hardening, low-temperature service, strength and elasticity

WHEN YOU'VE GOT to make better products for less money to stay competitive, you must have a good reason for using a premium material. While this principle goes across the board, it certainly carries more than the usual weight in looking at alloy versus carbon steel.

Alloys are expensive. Before buying, explore all design possibilities; but, they must be used when a property can't be obtained economically with carbon.

To put it another way: Alloy steels resist a variety of destructive forces always at work in machinery and equipment. They give higher strength per unit of weight without impairment of safety. They improve resistance to fatigue, corrosion, wear, the weakening effects of elevated temperatures and the embrittling effects of low temperatures.

Conservation—Demand for alloy steels was so great during World War II that the National Emergency (NE) steels were devised to conserve alloying elements. Some of these NE steels, such as the 8600 and 8700 series, the nickel-chromium-molybdenum types, have become standard and are doing a good job.

With the Korean conflict, problems of conservation again came up and even leaner alloys (with respect to certain alloying metals) were used. But the lean steels of World War II went a long way toward reducing primary alloy re-

What to expect from alloying elements

MANGANESE—When the maximum manganese content is specified within the limits of 1.65 to 2.10 per cent, the product is classified as alloy steel. Element helps strength, markedly increases deep hardening. Soluble in alpha and gamma iron, it also forms a carbide.

Medium manganese steels are not good for welding even at low carbon content. Tendency is to embrittle in the heat zone. Addition of vanadium overcomes difficulty.

Manganese content of 11 to 14 per cent, plus 1 to 1.4 per cent carbon, make the alloy austenitic. It is especially resistant to wear and abrasion under high impact stresses.

SILICON—When the maximum silicon content is specified within the limits of 0.60 to 2.20 per cent, the product is classed as alloy steel. Silicon is not a carbide forming element. It goes into solution in ferrite. When used in the specified range, it increases strength without loss of ductility. It raises the heating temperature for quenching treatment and promotes susceptibility to decarburization.

ALUMINUM—About 1 per cent promotes nitriding properties. It contributes to high hardness of the nitrided case by forming a hard, stable aluminum nitride component. Amount is considerably greater than that used to give a fine austenitic grain size in other alloy steels. Aluminum exerts a graphitizing effect on steels.

NICKEL—In annealed or untreated condition, it increases strength and elastic limit. It improves shock resistance and counteracts low temperature brittleness.

Nickel forms no carbides and remains in solution in the ferrite, strengthening and toughening that phase.

The 3.5 per cent nickel steels (2300 series) are widely used for highly stressed members. For welding, carbon should be under 0.12 per cent. Low carbon nickel steels, with about

quirements per ton of steel. Another such general reduction of comparable magnitude probably is not in sight.

Here are some figures in support of the above: Average alloy grade mix within the first half of 1953 was about 0.90 per cent nickel, 0.15 molybdenum and 0.75 chromium. With removal of government controls in the latter part of 1953, they jumped to over 1.2 nickel, over 0.20 molybdenum and about 0.90 chromium.

More Economy — In certain areas, reduction in alloy content is still possible with boron treatment and special quenching techniques. Some such changes are being adopted more broadly.

Design changes permit savings in selection of alloy steels. Example: Adoption of hypoid gears of small section for passenger cars reduced stresses and allowed use of carbon-chromium or other steels of moderate hardenability. They replace alloy steels of higher hardenability needed for spiral bevel gears of larger section.

Marked trend for faster quenching has been taking shape the past few years. Advantage is satisfactory hardening with leaner alloys—compared with higher alloy for the relatively slow, oil-hardening technique.

Result Counts—Users' philosophy is: If a section is fully hardened with a given quench, it makes little difference after tempering what the alloy composition might be; of course, tempering temperature must be high enough to soften the hardened steel appreciably.

Two other factors played a part in the shift to lower alloys: The importance engineers give to hardenability; and the possibility of getting fairly equal properties from direct hardening steels, containing 0.30 per cent carbon or more, when they are appropriately quenched and tempered.

Rule — Carbon steels are not through hardening in heat treatment, except in small sizes; they should not be used for large sections where properties must be about the same throughout the full cross section. H grades are not available in carbon steels.

This advice comes from a new handbook of the Department of Defense developed with the American Iron & Steel Institute to help in procurement of steel. Standard alloy compositions (to serve as a basis for procurement) are given in tables on metal selection chart (fold out insert opposite p. 120).

Surface hardness attainable after quenching is largely a function of the carbon content of the steel; depth of hardness penetration depends upon carbon content, total alloy and grain size. Taking into consideration the quenching medium, it is necessary to add only sufficient quantity of the proper alloying element to any steel to make it through hardening.

Must Quench Out—Steels have optimum properties as quenched when they contain at least 90 per cent martensite, the hardest microconstituent. Grades, such as 8630, which are relatively lean in alloying elements still quench out in water at the center of sections up to about 1 inch in diameter.

Medium hardening grades, such as 4140, quench out in oil to about 1½ inches; and deep hardening grades, such as 4340, harden in oil throughout up to about 4 inches in diameter.

Principles — For constructional uses, where strength is the prime requirement, ferrite and cementite still carry the load for alloy and carbon steels. The ferrite is helped by alloying elements; cementite has other elements replacing part of the iron in its iron carbide to modify properties.

Certainly, the lion's share of the strength is due to size and distribution of cementite particles. Alloy is merely a means of getting the needed distribution in sections that are unmanageable in carbon steels. Many alloying element combinations can assist in giving the needed structure and strength that go with it.

2 per cent nickel, give a moderate increase in strength over carbon steels and resistance to aging embrittlement.

Nickel steels are easily heat treated. The critical cooling rate needed to produce hardening on quenching is lowered. It also adds to strength and toughness of heat-treated steels.

When used with chromium, (31xx and 33xx series), nickel gives alloy steels higher elastic ratios, improved hardenability, greater impact and fatigue resistance.

CHROMIUM— Use in constructional alloy steels is primarily to increase hardness, improve hardenability and promote formation of carbides for wear resistance. It dissolves in alpha and gamma iron and is a strong carbide former.

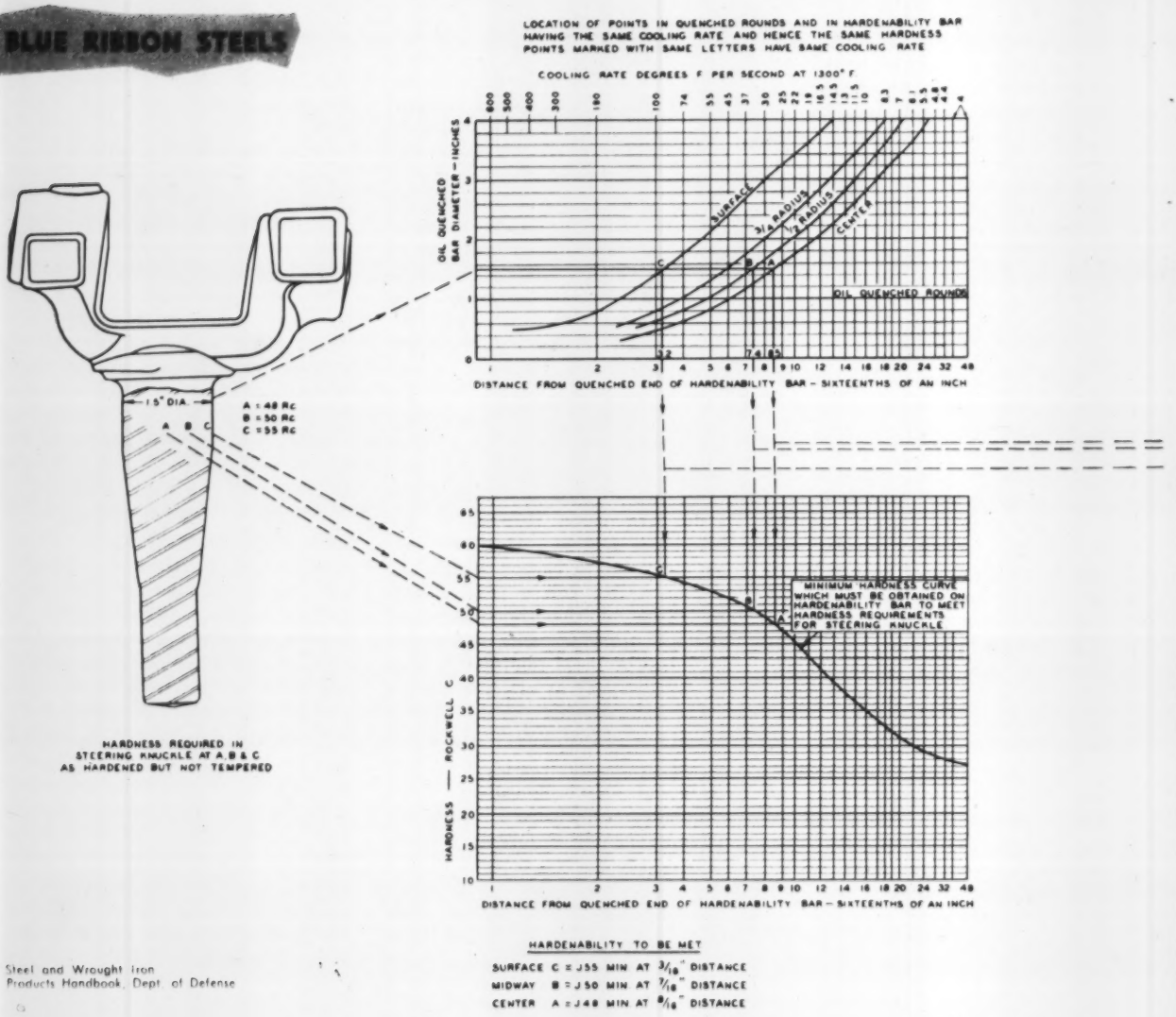
Although important as a hardening agent, chromium is frequently used with a toughening agent, such as nickel, for mechanical properties. In elevated-temperature, strength applications it is used with molybdenum.

In heat treatment, complex chromium carbides go into solution in austenite slowly. Sufficient time in heating for quenching must be allowed when handling medium carbon grades.

MOLYBDENUM— In common with manganese and chromium, it has a major effect on increasing hardenability. It can form a solid solution with ferrite or carbides. When molybdenum is in solid solution in austenite before quenching, reaction rate for transformation is slowed down to give a deep hardening steel.

Molybdenum steels in quenched condition require a higher tempering temperature to get degree to softness of other alloy steels. This is why such steels have improved high temperature tensile and creep strengths.

Alloy steels containing 0.15 to 0.30 per cent molybdenum have a minimum susceptibility to temper brittleness (low


LOCATION OF POINTS IN QUENCHED ROUNDS AND IN HARDENABILITY BAR HAVING THE SAME COOLING RATE AND HENCE THE SAME HARDNESS POINTS MARKED WITH SAME LETTERS HAVE SAME COOLING RATE
COOLING RATE DEGREES F PER SECOND AT 1300° F
OIL QUENCHED BAR DIAMETER — INCHES
SURFACE
3/4 RADIUS
1/2 RADIUS
CENTER
OIL QUENCHED ROUNDS
DISTANCE FROM QUENCHED END OF HARDENABILITY BAR — SIXTEENTHS OF AN INCH
1.5" DIA.
A = 48 Rc
B = 50 Rc
C = 55 Rc
A B C
HARDNESS REQUIRED IN STEERING KNUCKLE AT A, B & C AS HARDENED BUT NOT TEMPERED
HARDNESS — ROCKWELL C
MINIMUM HARDNESS CURVE WHICH MUST BE OBTAINED ON HARDENABILITY BAR TO MEET HARDNESS REQUIREMENTS FOR STEERING KNUCKLE
DISTANCE FROM QUENCHED END OF HARDENABILITY BAR — SIXTEENTHS OF AN INCH
HARDENABILITY TO BE MET
SURFACE C = J55 MIN AT 3/16" DISTANCE
MIDWAY B = J50 MIN AT 7/16" DISTANCE
CENTER A = J48 MIN AT 8/16" DISTANCE

Steel and Wrought Iron Products Handbook, Dept. of Defense

Alloying elements

resistance to impact). Molybdenum additions allow usual cooling rates on large parts after tempering without this danger.

VANADIUM—In constructional alloy steels, range is generally 0.03 to 0.25 per cent. It is a strong carbide former and dissolves to some degree in ferrite, giving improved strength and toughness. It promotes fine austenite grain size and minimizes tendency for grain growth in heat treating, permitting higher hardening and normalizing temperatures.

Hardenability of medium carbon steels is increased with minimum effect on grain size with vanadium additions of 0.04 to 0.08 per cent. Above this, hardenability decreases with normal quenching temperatures. Hardenability can be increased with the higher vanadium contents by increasing austenizing temperature.

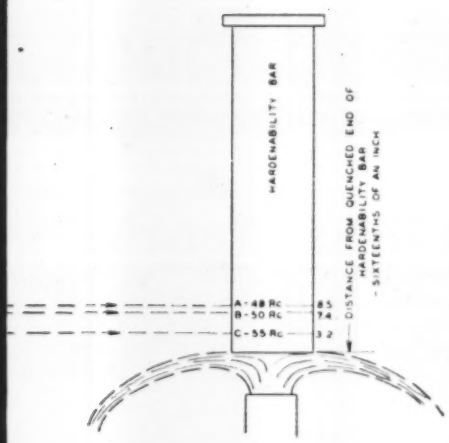
BORON— Purpose is to increase hardenability. Results are obtained only with fully killed steels. Minimum boron content is usually about 0.0005 per cent. These steels are evaluated by increased hardenability rather than chemical content.

Boron intensifies hardenability characteristics of elements already in steel. It makes conservation possible when used with steels containing relatively small amounts of alloys. Its effectiveness diminishes as carbon increases—use is not recommended above the 0.60 per cent carbon level.

Boron is generally used in the 0.30 to 0.50 per cent carbon range—and to a lesser extent in the 0.20 per cent carbon carburizing grades, because it improves only the core properties and does not increase depth hardening of the case.

MULTIPLE ELEMENTS— Combination of two or more alloying elements imparts some of the characteristic properties of each. Constructional chromium-nickel steels give good hardening properties with fine ductility. Chromium-molybdenum combinations give good hardenability with satisfactory ductility and a certain degree of heat resistance.

Combined effect of two or more alloying elements on hardenability is greater than the sum of the effects of the same alloying elements used separately. The all-around effectiveness of the nickel-chromium-molybdenum steels, with and without boron, is accounted for by this.



HOW TO PICK AN ALLOY STEEL FOR HARDENABILITY

Part is an automotive steering knuckle. For maximum service life, hardness at the 1.5-inch diameter section, as quenched, should be: Rc 48 min. at center; Rc 50 min. at mid-radius; Rc 55 min. at surface.

With oil as the cooling medium, the SAE cooling rate curve shows certain distances on the end quench test are necessary to give equal cooling rates: Center, 8/16-inch; mid-radius, 7/16-inch; surface, 3/16-inch.

Converting above to metallurgical terms, we have: Center, J48 min. at 8/16-inch; mid-radius, J50 min. at 7/16-inch; surface, J55 min. at 3/16-inch.

Hardenability values in SAE, fundamental alloy, bar hardenability specification show that 8747H, 4147H or 8650H will meet requirements.

Don't Overdo It—There is no point in using over-alloyed steel, say, for instance, in a small section. Excess alloy adds little to properties. It may be dangerous by increasing susceptibility to quenching cracks. Another point: Low tempering temperatures are usually best to avoid, unless wear alone is the main consideration.

Factors other than hardenability come into play with service conditions of low temperature impact, heavy shock, creep resistance and resistance to temper brittleness.

Here's another point: Through hardening is undesirable for some uses. Shallow hardening is specified in many shock applications. The softer core prevents excessive breakage.

Definition—Degree to which a steel hardens when quenched at different cooling rates shows its ability to harden under heat treatment. Hardenability is measured quantitatively—depth of hardening on a standard specimen in a standard quench (note hardenability bar in diagram). In the end-quench test, depth of hardening is the distance from the quenched end to a given hardness.

Experiments have indicated points on the hardenability curve that approximate the cooling rates at the center, mid-radius and surface of rounds. Several sizes are quenched in different coolants (curve of this type is shown in diagram). When cooling rates are the same in test piece and the position in the round, hardness figures are closely equivalent.

Significance—When end quench curves of different steels nearly coincide, materials can be treated similarly for equivalent tensile properties in sections of the same size.

Here's how to save alloying materials: Steels in each group below have about equivalent hardenability. They can be heat treated in the same manner at appropriate tempering temperatures for similar mechanical properties in equivalent sections. Each uses decreasing amounts of alloying materials to reach the same level of hardenability.

1. 4042, 5140, TS8140
2. 3140, 4140, 8640, TS8640, TS81B40
3. 4340, 9840, TS86B45

Unhardened Steels — Engineering alloy steels may be used in the unhardened condition—as rolled, normalized or annealed. Chief reasons for adding alloys are improved hardness and strength properties. Yield point of ingot iron and low-carbon steels is only 25,000 to 35,000 psi.

If it were merely a matter of strength, 1 per cent carbon steel might be used. It has a yield point around 80,000 psi and strength close to 150,000 psi.

Here's the catch: From a practical standpoint, multiple requirements generally enter the picture. Need for strength or elastic properties seldom can be divorced from requirements associated with fabrication or service conditions.

Not Simple — Strength properties above low carbon steels can be realized by addition of many available alloys, singly or in combination. But different compositions necessarily do not give similarity in fabricating properties and service performance.

Some requirements for rolled sheets in flat products and shapes:

1. Adequate strength, represented by yield points of 40,000 to 50,000 psi minimum or higher depending on section and end use.
2. Ease of fabrication in cutting, hot and cold forming, machining and welding.
3. Special service requirements include resistance to corrosion and abrasion, strength at elevated temperatures, notch toughness at low temperatures.
4. Moderate cost.

Principle — Alloy additions to low carbon steels moderately raise hardness, elastic properties and strength. Reason: Solid solutions formed with ferrite.

Higher carbon steels are strengthened but the solid solution effect may not predominate. Over-all benefits: The sum of relatively small strengthening from solid solution in ferrite and hardening brought about by changes in amounts, nature and distribution of the carbide.

Normalized Steels—Amount of hardening and strengthening from alloy in normalized steels, whether from action on ferrite or the carbide, depends upon carbon level. Alloys that seek the ferrite and carbide formers, lower the eutectoid ratio.

Alloy steels have a higher portion of carbide at a given carbon content than plain carbon steels, under comparable conditions of manufacture and treatment.

Principle is used to gain toughness and improve plasticity. By reducing carbon content in alloy steels to the level at which strength is equivalent to (or perhaps slightly greater than) plain carbon steels, higher notch test values and greater ductility in tension result.

In welding applications, alloy steels with needed strength properties and lowest carbon levels have distinct advantages.

LIGHT METALS FORUM

Dow Chemical Co.

Industry Leans Heavily on Light Metals

See what the major suppliers are doing in alloy development and improvement. They're keeping one eye on industry's needs today while working up better materials for tomorrow

Cheaper Magnesium Mill Products

By W. H. GROSS and P. L. FILTER
Dow Chemical Co.

WHILE primary interest in structural magnesium alloys has been in the field of aircraft and military applications, in the recent past a growing interest in industrial and commercial uses of magnesium has broadened the industry considerably.

Increase in use of wrought magnesium products reached a point where further expansion of facilities became necessary. Construction of the first facility in the world for the mass production of magnesium mill products has been under way at Madison, Ill. These facilities, inaugurating a new era in the magnesium industry, will be formally opened in the near future.

The real significance of such a development lies in the reduction in price made possible by new techniques and in the fact that because wider and longer sheet will now be available, in effect, a new product is available.

Castings—In the casting field, the development of new alloys, capable of withstanding greater loads at higher operating temperatures, has extended the range of usefulness of magnesium.

These alloys, beginning with the rare earth-containing alloys and extending through those experimental alloys containing thorium and zirconium, appear to increase the possibility of obtaining greater jet engine performance without the accompanying weight penalty.

Less Machining—Improved casting methods, including the shell molding process and plaster casting, have bettered surface quality, reduced machining and resulted in generally improved castings.

The new low-priced magnesium die casting alloy AZ91B has bettered the competitive position of magnesium die castings in the automotive industry. While one major automobile manufacturer uses an average of five pounds of magnesium per automobile, the success of the metal in such applications portends its greater use in the future.

Standard Items—Conventional items in the materials handling field, such as hand trucks, dock boards, barrel skids, can forks, and car loading tubes, have become standard magnesium items. Newer products, such as platform trucks, department store "push-arounds" and the trailer ramps used in loading truck trailers on flat cars for "piggy back" freight movements, have been designed and manufactured in magnesium.

Magnesium is proving itself in the commercial highway transportation industry, including truck bodies and trailer flooring. With the development of new anodize treatments, such as HAE and the Dow No. 17 treatment for the protection of the metal, its use is expected to increase.

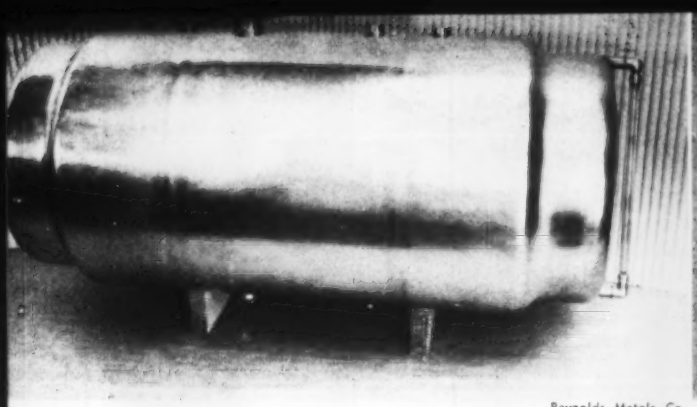
Higher Strength Aluminum Alloys

By BRUCE E. BRENNAN
Supervisor, Engineering Data, Reynolds Metals Co.

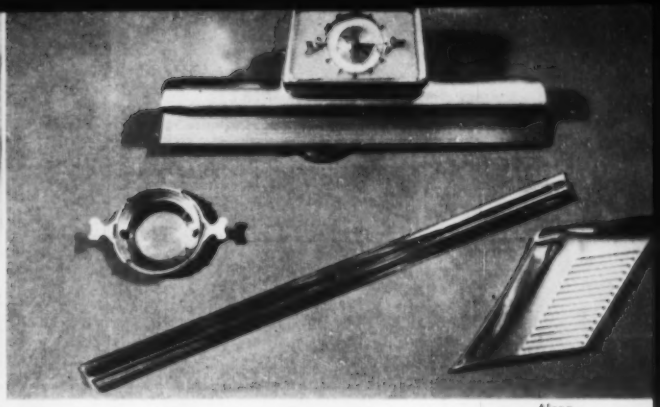
ALLOY development during the past few years has been largely concentrated on the higher strength, general purpose, work hardening alloys. In this broad field of potential uses alloys have been perfected for specific purposes such as corrosion resistance, weldability, formability, and anodizing quality. A most important criterion in all of this development work has been the reduction of cost of the mill product and the cost of fabrication and finishing operations.

Three new alloys available as sheet and plate exemplify this trend: A54S has excellent corrosion resistance, strength and weldability, C57S provides attractive anodized finishes, and R305 has good strength and corrosion resistance.

Work Hardening—R305 is a work hardening alumi-



Reynolds Metals Co.



Alcoa

num-magnesium sheet alloy that has many of the characteristics of 3S, an aluminum-manganese-magnesium alloy. Alloys of this composition are designated A50S by Alcoa and K155 by Kaiser Aluminum.

For most applications R305 can be used as a direct substitute for 3S. Its fine grain structure will frequently offer advantages in those applications requiring good surface appearance after forming. Anodized R305 has a clearer and lighter film than either 3S or 52S and provides a better match with 63S extrusions.

Exceptional Finish—C57S is a work hardening aluminum-magnesium-manganese sheet alloy developed for attractive anodized finishes to meet the trends to artistic styling that are so evident in the automotive and home appliance fields. Chemical or electro-brightening followed by anodizing produces an exceptional mirror-like finish on C57S.

This alloy is especially recommended for those applications that must combine good strength, corrosion resistance and excellent appearance and is consequently a popular alloy for refrigerator shelves, and other household wares that require a fine decorative surface.

Excellent Weldability—Alloy A54S is a relatively new work hardening aluminum - magnesium alloy which has demonstrated excellent corrosion resistance and weldability in sheet and plate products. Its mechanical properties lie generally between those of the alloys 52S and 56S. Mechanical properties of A54S are somewhat higher than those of 52S and in some tempers are comparable with 61S-T6. A54S work hardens more rapidly than 52S. Alloy is especially recommended for the construction of tanks for use with chemical solutions.

Aluminum Design Tips

By J. R. WILLARD
Manager, Sales Development Division, Aluminum Co. of America

WITH no allocations to limit its application, aluminum is rapidly broadening its uses throughout industry. The choice of aluminum as a material is always one of economics—when it does the job right at a favorable cost, then aluminum should be used.

Most important criteria for evaluating aluminum as a material are its basic characteristics. These offer many economic advantages, and govern and control selection of aluminum for product design:

Light Weight—Aluminum has one third the volume weight of iron, steel, or brass. Logical applications provide payload savings in trailer construction and inertia reduction on machines, and permit use of thicker and safer sections in designs based on weight limitations.

Corrosion Resistance—This characteristic makes aluminum ideal for processing industry and chemical plant equipment, for use where color and taste contamination should be avoided, and for such uses as tank cars and shipping containers.

High Electrical Conductivity—Aluminum wire with conductivity equal to that of copper has only half the weight. Aluminum is valuable for rotor castings, foil condensers, and electronic parts.

High Heat Conductivity — This property makes aluminum desirable in processing equipment, pistons, heat exchangers, radiators, refrigeration, cooking utensils, and similar applications.

High Reflectivity—This characteristic makes aluminum outstanding in such applications as insulation, radiant shielding in industry, roofing and siding, and searchlight reflectors.

Workability—Aluminum is easy to work, is available in all commercial forms, and can be assembled by all common joining methods. Since aluminum is easier to work and lighter to handle, its use can help reduce labor costs.

Non-Sparking — Aluminum used in applications such as machinery, tools, and handling equipment eliminates one possibility of spark-caused explosions in presence of dust, fumes, and flammable substances.

Appearance—Both its natural silver-white color and its ability to receive all commercial types of finishes make aluminum desirable for use in such diverse fields as architecture and giftware.

High Scrap Value—There is a good market for aluminum scrap resulting from processing and manufacturing activities such as stamping and screw machining.

Promising Al-Mg Alloys

By J. R. YOUNG
Manager, Product Development, Kaiser Aluminum & Chemical Corp.

IN ITS RESEARCH and development work on new alloys, Kaiser Aluminum has been devoting considerable attention to the Al-Mg and Al-Mg-Mn wrought alloys.

The first commercial alloy to result from this work,

STEEL
MAY 10, 1954

Metal Selector

Here are the practical details that will help you in the selection of the New and Improved Alloys you hear so much about these days—including Alloy, H, Stainless and Heat-resistant Steels, Aluminum, Magnesium, Copper-base Alloys and Titanium. For more information on use properties, refer to the Technical Section in this issue of STEEL

STAINLESS

Standard and Tentative Standard Stainless and Heat-Resistant Steels

AISI Type No.	C	Mn Max.	Si Max.	Cr	Ni	Other	Properties
301	Over .08-.20	2.00	1.00	16-18	6-8	....	Rapid work-hardening
302	Over .08-.20	2.00	1.00	17-19	8-10	....	General-purpose chromium-nickel type
302B	Over .08-.20	2.00	2-3	17-19	8-10	....	Higher scaling resistance
303	0.15 max.	2.00	1.00	17-19	8-10	*	Free-machining
304	0.08 max.	2.00	1.00	18-20	8-11	....	General-purpose—welding
304L	0.03 max.	2.00	1.00	18-20	8-11	....	Weldments for severely corrosive conditions
305	0.12 max.	2.00	1.00	17-19	10-13	....	Low work-hardening rate
308	0.08 max.	2.00	1.00	19-21	10-12	....	Welding rod and electrodes
309	0.20 max.	2.00	1.00	22-24	12-15	....	High scale resistance and good strength at high temperatures
309S	0.08 max.	2.00	1.00	22-24	12-15	....	Weldments with high scale resistance, good strength
310	0.25 max.	2.00	1.50	24-26	19-22	....	Like 309 but even higher heat resistance
310S	0.08 max.	2.00	1.50	24-26	19-22	....	Like 309S but even higher heat resistance
314	0.25 max.	2.00	1.50-3	23-26	19-22	....	Highest heat resistance
316	0.10 max.	2.00	1.00	16-18	10-14	Mo 2-3	Higher resistance to certain corrosives which can affect other stainless steels, such as halide salts. Also high creep resistance at high temperatures. TS 316 is alloy conservation version. 316L is version for weldments. 317 is higher in corrosion and creep resistance
TS 316	0.10 max.	2.00	1.00	16-18	10-14	Mo 1.75-2.5	
316L	0.03 max.	2.00	1.00	16-18	10-14	Mo 1.75-2.5	
317	0.10 max.	2.00	1.00	18-20	11-14	Mo 3-4	
321	0.08 max.	2.00	1.00	17-19	8-11	Ti 5xC min.	For weldments subject to severely corrosive conditions and/or service in 800°-1650° F temperature range
347	0.08 max.	2.00	1.00	17-19	9-12	Cb 10xC min.	
TS 347	0.08 max.	2.00	1.00	17-19	9-12	Cb 8xC min.	
TS 347A	0.08 max.	2.00	1.00	17-19	9-12	Cb-Ta 8xC min.	
403	0.15 max.	1.00	0.50	11.5-13	....	....	Steam turbine blades
405	0.08 max.	1.00	1.00	11.5-13.5	....	Al 0.10-0.30	Low hardenability
410	0.15 max.	1.00	1.00	11.5-13.5	....	....	General-purpose. Hardenable by heat treatment
414	0.15 max.	1.00	1.00	11.5-13.5	1.25-2.5	....	High-strength version of 410
416	0.15 max.	1.25	1.00	12-14	....	*	Free-machining
420	Over 0.15	1.00	1.00	12-14	....	....	High hardness from heat treatment. Cutlery
430	0.12 max.	1.00	1.00	14-18	....	....	General-purpose chromium type
430F	0.12 max.	1.25	1.00	14-18	....	*	Free-machining
431	0.20 max.	1.00	1.00	15-17	1.25-2.5	....	Special-purpose hardenable
440A	0.6-0.75	1.00	1.00	16-18	....	Mo 0.75 max.	High strength and corrosion resistance. Hardenable by heat treatment
440B	0.75-0.95	1.00	1.00	16-18	....	Mo 0.75 max.	Cutlery grade
440C	0.95-1.20	1.00	1.00	16-18	....	Mo 0.75 max.	Ball bearing grade
446	0.35 max.	1.50	1.00	23-27	....	N 0.25 max.	Resistance to high-temperature scaling and hot sulphur-bearing gases
501	Over 0.1	1.00	1.00	4-6	....	....	Resistance to scaling, but not corrosion
502	0.1 max.	1.00	1.00	4-6	....	....	

Source: American Iron & Steel Institute
* Phosphorus, sulphur or selenium: 0.07 min., zirconium or molybdenum: 0.60 maximum.
TS grades were developed to meet limitations set by National Production Authority in 1951.

ALLOY STEELS

Chemical Composition Ranges and Limits Include Tentative Standard (TS) and Boron Steels Developed to Conserve Nickel and Molybdenum

AISI Number	C	Mn	P Max.	S Max.	Si	Ni	Cr	Mo
1330	0.28–0.33	1.60–1.90	0.040	0.040	0.20–0.35	.....	.....	.....
1335	0.33–0.38	1.60–1.90	0.040	0.040	0.20–0.35	.....	.....	.....
1340	0.38–0.43	1.60–1.90	0.040	0.040	0.20–0.35	.....	.....	.....
1345	0.43–0.48	1.60–1.90	0.040	0.040	0.20–0.35	.....	.....	.....
TS 14B35	0.33–0.38	0.75–1.00	....	....	0.20–0.35	.....	.....	.....
TS 14B50	0.48–0.53	0.75–1.00	....	....	0.20–0.35	.....	.....	.....
2317	0.15–0.20	0.40–0.60	0.040	0.040	0.20–0.35	3.25–3.75	.....	.....
2515	0.12–0.17	0.40–0.60	0.040	0.040	0.20–0.35	4.75–5.25	.....	.....
E2517	0.15–0.20	0.45–0.60*	0.025	0.025	0.20–0.35	4.75–5.25	.....	.....
3120	0.17–0.22	0.60–0.80	0.040	0.040	0.20–0.35	1.10–1.40	0.55–0.75	.....
3130	0.28–0.33	0.60–0.80	0.040	0.040	0.20–0.35	1.10–1.40	0.55–0.75	.....
3135	0.33–0.38	0.60–0.80	0.040	0.040	0.20–0.35	1.10–1.40	0.55–0.75	.....
3140	0.38–0.43	0.70–0.90	0.040	0.040	0.20–0.35	1.10–1.40	0.55–0.75	.....
E3310	0.08–0.13	0.45–0.60*	0.025	0.025	0.20–0.35	3.25–3.75	1.40–1.75	.....
E3316	0.14–0.19	0.45–0.60*	0.025	0.025	0.20–0.35	3.25–3.75	1.40–1.75	.....
TS 4012	0.09–0.14	0.75–1.00	0.040	0.040	0.20–0.35	.....	.....	0.15–0.25
4023	0.20–0.25	0.70–0.90	0.040	0.040	0.20–0.35	.....	.....	0.20–0.30
4024	0.20–0.25	0.70–0.90	0.040	0.035–0.050	0.20–0.35	.....	.....	0.20–0.30
4027	0.25–0.30	0.70–0.90	0.040	0.040	0.20–0.35	.....	.....	0.20–0.30
4028	0.25–0.30	0.70–0.90	0.040	0.035–0.050	0.20–0.35	.....	.....	0.20–0.30
4032	0.30–0.35	0.70–0.90	0.040	0.040	0.20–0.35	.....	.....	0.20–0.30
4037	0.35–0.40	0.70–0.90	0.040	0.040	0.20–0.35	.....	.....	0.20–0.30
TS 40B37	0.35–0.40	0.70–0.90	....	....	0.20–0.35	.....	.....	0.08–0.15
4042	0.40–0.45	0.70–0.90	0.040	0.040	0.20–0.35	.....	.....	0.20–0.30
4047	0.45–0.50	0.70–0.90	0.040	0.040	0.20–0.35	.....	.....	0.20–0.30
4053	0.50–0.56	0.75–1.00	0.040	0.040	0.20–0.35	.....	.....	0.20–0.30
4063	0.60–0.67	0.75–1.00	0.040	0.040	0.20–0.35	.....	.....	0.20–0.30
4068	0.63–0.70	0.75–1.00	0.040	0.040	0.20–0.35	.....	.....	0.20–0.30
4118	0.18–0.23	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.40–0.60	0.08–0.15
4130	0.28–0.33	0.40–0.60	0.040	0.040	0.20–0.35	.....	0.80–1.10	0.15–0.25
TS 4130	0.28–0.33	0.45–0.65	0.040	0.040	0.20–0.35	.....	0.90–1.20	0.08–0.15
TS 4132	0.30–0.35	0.45–0.65	0.040	0.040	0.20–0.35	.....	0.90–1.20	0.08–0.15
4135	0.33–0.38	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.80–1.10	0.15–0.25
4137	0.35–0.40	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.80–1.10	0.15–0.25
TS 4137	0.35–0.40	0.75–1.00	0.040	0.040	0.20–0.35	.....	0.90–1.20	0.08–0.15
4140	0.38–0.43	0.75–1.00	0.040	0.040	0.20–0.35	.....	0.80–1.10	0.15–0.25
TS 4140	0.38–0.43	0.80–1.05	0.040	0.040	0.20–0.35	.....	0.90–1.20	0.08–0.15
4142	0.40–0.45	0.75–1.00	0.040	0.040	0.20–0.35	.....	0.80–1.10	0.15–0.25
TS 4142	0.40–0.45	0.80–1.05	0.040	0.040	0.20–0.35	.....	0.90–1.20	0.08–0.15
4145	0.43–0.48	0.75–1.00	0.040	0.040	0.20–0.35	.....	0.80–1.10	0.15–0.25
TS 4145	0.43–0.48	0.80–1.05	0.040	0.040	0.20–0.35	.....	0.90–1.20	0.08–0.15
4147	0.45–0.50	0.75–1.00	0.040	0.040	0.20–0.35	.....	0.80–1.10	0.15–0.25
4150	0.48–0.53	0.75–1.00	0.040	0.040	0.20–0.35	.....	0.80–1.10	0.15–0.25
TS 4150	0.48–0.53	0.80–1.05	0.040	0.040	0.20–0.35	.....	0.90–1.20	0.08–0.15
42B35	0.32–0.39	0.70–1.00	....	....	0.20–0.35	.....	0.40–0.65	0.08–0.15
42B40	0.37–0.45	0.70–1.00	....	....	0.20–0.35	.....	0.40–0.65	0.08–0.15
42B45	0.42–0.50	0.70–1.00	....	....	0.20–0.35	.....	0.40–0.65	0.08–0.15
42B50	0.47–0.55	0.70–1.00	....	....	0.20–0.35	.....	0.40–0.65	0.08–0.15
TS 43BV12	0.08–0.13	0.75–1.00	....	V 0.03 Min.	0.20–0.40	1.65–2.00	0.40–0.60	0.20–0.30
TS 43BV14	0.10–0.15	0.45–0.65	....	0.03 Min.	0.20–0.35	1.65–2.00	0.40–0.60	0.08–0.15
4320	0.17–0.22	0.45–0.65	0.040	0.040	0.20–0.35	1.65–2.00	0.40–0.60	0.20–0.30
4337	0.35–0.40	0.60–0.80**	0.040	0.040	0.20–0.35	1.65–2.00	0.70–0.90	0.20–0.30
4340	0.38–0.43	0.60–0.80	0.040	0.040	0.20–0.35	1.65–2.00	0.70–0.90	0.20–0.30
E4340	0.38–0.43	0.65–0.85	0.025	0.025	0.20–0.35	1.65–2.00	0.70–0.90	0.20–0.30
4608	0.06–0.11	0.25–0.45	0.040	0.040	0.25 Max.	1.40–1.75	.....	0.15–0.25
TS 46B12	0.10–0.15	0.45–0.65	....	....	0.20–0.35	1.65–2.00	.....	0.20–0.30
4615	0.13–0.18	0.45–0.65	0.040	0.040	0.20–0.35	1.65–2.00	.....	0.20–0.30
4617	0.15–0.20	0.45–0.65	0.040	0.040	0.20–0.35	1.65–2.00	.....	0.20–0.30
4620	0.17–0.22	0.45–0.65	0.040	0.040	0.20–0.35	1.65–2.00	.....	0.20–0.30
X4620	0.18–0.23	0.50–0.70	0.040	0.040	0.20–0.35	1.65–2.00	.....	0.20–0.30
4621	0.18–0.23	0.70–0.90	0.040	0.040	0.20–0.35	1.65–2.00	.....	0.20–0.30
4640	0.38–0.43	0.60–0.80	0.040	0.040	0.20–0.35	1.65–2.00	.....	0.20–0.30
TS 4720	0.17–0.22	0.50–0.70	0.040	0.040	0.20–0.35	0.90–1.20	0.35–0.55	0.15–0.25
4812	0.10–0.15	0.40–0.60	0.040	0.040	0.20–0.35	3.25–3.75	.....	0.20–0.30
4815	0.13–0.18	0.40–0.60	0.040	0.040	0.20–0.35	3.25–3.75	.....	0.20–0.30
4817	0.15–0.20	0.40–0.60	0.040	0.040	0.20–0.35	3.25–3.75	.....	0.20–0.30
4820	0.18–0.23	0.50–0.70	0.040	0.040	0.20–0.35	3.25–3.75	.....	0.20–0.30
5015	0.12–0.17	0.30–0.50	0.040	0.040	0.20–0.35	.....	0.30–0.50	.....
50B15	0.12–0.18	0.70–1.00	....	....	0.20–0.35	.....	0.35–0.60	.....
50B20	0.17–0.23	0.70–1.00	....	....	0.20–0.35	.....	0.35–0.60	.....
50B30	0.27–0.34	0.70–1.00	....	....	0.20–0.35	.....	0.35–0.60	.....
50B35	0.32–0.39	0.70–1.00	....	....	0.20–0.35	.....	0.35–0.60	.....
50B40	0.37–0.45	0.70–1.00	....	....	0.20–0.35	.....	0.35–0.60	.....
50B44	0.42–0.50	0.70–1.00	....	....	0.20–0.35	.....	0.35–0.60	.....
5046	0.43–0.50	0.75–1.00	0.040	0.040	0.20–0.35	.....	0.20–0.35	.....
TS 50B46	0.43–0.50	0.75–1.00	....	....	0.20–0.35	.....	0.20–0.35	.....
TS 50B50	0.48–0.53	0.75–1.00	....	....	0.20–0.35	.....	0.40–0.60	.....
TS 50B60	0.55–0.65	0.75–1.00	....	....	0.20–0.35	.....	0.40–0.60	.....
5117	0.15–0.20	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.70–0.90	.....
5120	0.17–0.22	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.70–0.90	.....
5130	0.28–0.33	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.80–1.10	.....
5132	0.30–0.35	0.60–0.80	0.040	0.040	0.20–0.35	.....	0.75–1.00	.....
5135	0.33–0.38	0.60–0.80	0.040	0.040	0.20–0.35	.....	0.80–1.05	.....
5140	0.38–0.43	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.70–0.90	.....
5145	0.43–0.48	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.70–0.90	.....
5147	0.45–0.52	0.70–0.95	0.040	0.040	0.20–0.35	.....	0.85–1.15	.....
5150	0.48–0.53	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.70–0.90	.....
5152	0.48–0.55	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.90–1.20	.....
5155	0.50–0.60	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.70–0.90	.....
5160	0.55–0.65	0.75–1.00	0.040	0.040	0.20–0.35	.....	0.70–0.90	.....
TS 51B60	0.55–0.65	0.75–1.00	....	....	0.20–0.35	.....	0.70–0.90	.....
E50100	0.95–1.10	0.25–0.45	0.025	0.025	0.20–0.35	.....	0.40–0.60	.....
E51100	0.95–1.10	0.25–0.45	0.025	0.025	0.20–0.35	.....	0.90–1.15	.....
E52100	0.95–1.10	0.25–0.45	0.025	0.025	0.20–0.35	.....	1.30–1.60	.....
6117	0.15–0.20	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.70–0.90	V 0.10 Min.
6120	0.17–0.22	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.70–0.90	0.10 Min.
6145	0.43–0.48	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.80–1.10	0.15 Min.
6150	0.48–0.53	0.70–0.90	0.040	0.040	0.20–0.35	.....	0.80–1.10	0.15 Min.

AISI Number	C	Mn	P Max.	S Max.	Si	Ni	Cr	Mo
80B20	0.17–0.23	0.60–0.90	....	....	0.20–0.35	0.20–0.40	0.15–0.35	0.08–0.15
80B30	0.27–0.34	0.55–0.80	....	....	0.20–0.35	0.20–0.40	0.15–0.35	0.08–0.15
80B35	0.32–0.39	0.65–0.95	....	....	0.20–0.35	0.20–0.40	0.15–0.35	0.08–0.15
TS 80B37	0.35–0.40	0.75–1.00	....	....	0.20–0.35	0.20–0.40	0.20–0.35	0.08–0.15
TS 80B40	0.38–0.43	0.75–1.00	....	....	0.20–0.35	0.20–0.40	0.20–0.35	0.08–0.15
TS 80B45	0.43–0.48	0.75–1.00	....	....	0.20–0.35	0.20–0.40	0.20–0.35	0.08–0.15
80B50	0.47–0.55	0.70–1.00	....	....	0.20–0.35	0.20–0.40	0.25–0.50	0.08–0.15
80B55	0.50–0.60	0.70–1.00	....	....	0.23–0.35	0.20–0.40	0.30–0.55	0.08–0.15
80B60	0.55–0.65	0.70–1.00	....	....	0.20–0.35	0.20–0.40	0.30–0.55	0.08–0.15
TS 8115	0.13–0.18	0.70–0.90	0.040	0.040	0.20–0.35	0.20–0.40	0.30–0.50	0.08–0.15
TS 8117	0.15–0.20	0.70–0.90	0.040	0.040	0.20–0.35	0.20–0.40	0.30–0.50	0.08–0.15
TS 8120	0.18–0.23	0.70–0.90	0.040	0.040	0.20–0.35	0.20–0.40	0.30–0.50	0.08–0.15
TS 8122	0.20–0.25	0.70–0.90	0.040	0.040	0.20–0.35	0.20–0.40	0.30–0.50	0.08–0.15
TS 8123	0.20–0.25	0.70–0.90	0.040	0.035–0.050	0.20–0.35	0.20–0.40	0.30–0.50	0.08–0.15
TS 8125	0.23–0.28	0.70–0.90	0.040	0.040	0.20–0.35	0.20–0.40	0.30–0.50	0.08–0.15
TS 8126	0.23–0.28	0.70–0.90	0.040	0.035–0.050	0.20–0.35	0.20–0.40	0.30–0.50	0.08–0.15
TS 8127	0.25–0.30	0.70–0.90	0.040	0.040	0.20–0.35	0.20–0.40	0.30–0.50	0.08–0.15
TS 8128	0.25–0.30	0.70–0.90	0.040	0.035–0.050	0.20–0.35	0.20–0.40	0.30–0.50	0.08–0.15
81B35	0.32–0.39	0.70–1.00	....	....	0.20–0.35	0.20–0.40	0.30–0.55	0.08–0.15
TS 81B40	0.38–0.43	0.75–1.00	....	....	0.20–0.35	0.20–0.40	0.35–0.55	0.08–0.15
TS 81B45	0.43–0.48	0.75–1.00	....	....	0.20–0.35	0.20–0.40	0.35–0.56	0.08–0.15
81B50	0.47–0.55	0.75–1.05	....	....	0.20–0.35	0.20–0.40	0.35–0.60	0.08–0.15
8615	0.13–0.18	0.70–0.90	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
TS 8615	0.13–0.18	0.70–0.90	0.040	0.040	0.20–0.35	0.30–0.60	0.55–0.75	0.08–0.15
8617	0.15–0.20	0.70–0.90	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
TS 8617	0.15–0.20	0.70–0.90	0.040	0.040	0.20–0.35	0.30–0.60	0.55–0.75	0.08–0.15
8620	0.18–0.23	0.70–0.90	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
TS 8620	0.18–0.23	0.70–0.90	0.040	0.040	0.20–0.35	0.30–0.60	0.55–0.75	0.08–0.15
8622	0.20–0.25	0.70–0.90	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
TS 8622	0.20–0.25	0.70–0.90	0.040	0.040	0.20–0.35	0.30–0.60	0.55–0.75	0.08–0.15
8625	0.23–0.28	0.70–0.90	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
TS 8625	0.23–0.28	0.70–0.90	0.040	0.040	0.20–0.35	0.30–0.60	0.55–0.75	0.08–0.15
8627	0.25–0.30	0.70–0.90	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
TS 8627	0.25–0.30	0.70–0.90	0.040	0.040	0.20–0.35	0.30–0.60	0.55–0.75	0.08–0.15
8630	0.28–0.33	0.70–0.90	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
8635	0.33–0.38	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
8637	0.35–0.40	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
8640	0.38–0.43	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
8641	0.38–0.43	0.75–1.00	0.040	0.040–0.060	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
8642	0.40–0.45	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
8645	0.43–0.48	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
86B45***	0.43–0.48	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
8650	0.48–0.53	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
8653	0.50–0.56	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.50–0.80	0.15–0.25
8655	0.50–0.60	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
8660	0.55–0.65	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.15–0.25
8715	0.13–0.18	0.70–0.90	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.20–0.30
8717	0.15–0.20	0.70–0.90	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.20–0.30
8720	0.18–0.23	0.70–0.90	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.20–0.30
8735	0.33–0.38	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.20–0.30
8740	0.38–0.43	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.20–0.30
8742	0.40–0.45	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.20–0.30
8750	0.48–0.53	0.75–1.00	0.040	0.040	0.20–0.35	0.40–0.70	0.40–0.60	0.20–0.30
9255	0.50–0.60	0.70–0.95	0.040	0.040	1.80–2.20	.....	.....	.....
9260	0.55–0.65	0.70–1.00	0.040	0.040	1.80–2.20	.....	.....	.....
9261	0.55–0.65	0.75–1.00	0.040	0.040	1.80–2.20	.....	0.10–0.25	.....
9262	0.55–0.65	0.75–1.00	0.040	0.040	1.80–2.20	.....	0.25–0.40	.....
E9310	0.08–0.13	0.45–0.65	0.025	0.025	0.20–0.35	3.00–3.50	1.00–1.40	0.08–0.15
E9314	0.11–0.17	0.40–0.70	0.025	0.025	0.20–0.35	3.00–3.50	1.00–1.40	0.08–0.15
TS 94B15	0.13–0.18	0.75–1.00	....	....	0.20–0.35	0.30–0.60	0.30–0.50	0.08–0.15
TS 94B17	0.15–0.20	0.75–1.00	....	....	0.20–0.35	0.30–0.60	0.30–0.50	0.08–0.15
TS 94B20	0.17–0.22	0.75–1.00	....	....	0.20–0.35	0.30–0.60	0.30–0.50	0.08–0.15
TS 94B30	0.28–0.33	0.75–1.00	....	....	0.20–0.35	0.30–0.60	0.30–0.50	0.08–0.15
TS 94B40	0.38–0.43	0.75–1.00	....	....	0.20–0.35	0.30–0.60	0.30–0.50	0.08–0.15
9840	0.38–0.43	0.70–0.90	0.040	0.040	0.20–0.35	0.85–1.15	0.70–0.90	0.20–0.30
9845	0.43–0.48	0.70–0.90	0.040	0.040	0.20–0.35	0.85–1.15	0.70–0.90	0.20–0.30
9850	0.48–0.53	0.70–0.90	0.040	0.040	0.20–0.35	0.85–1.15	0.70–0.90	0.20–0.30

Source: American Iron & Steel Institute—1954

*For open hearth steel manganese is 0.40–0.60.

**For electric furnace steel manganese is 0.65–0.85.

***Grade 86B45 is a standard steel.

NOTES

1. TS denotes tentative standard steels.
2. Boron steels indicated by B can be expected to have 0.0005 per cent minimum boron content.
3. Grades shown with prefix E are manufactured by basic electric furnace process. All others are normally produced by the basic open hearth process but may be made by the basic electric furnace process with adjustments in phosphorus and sulphur.
4. Ranges and limits in this table apply to material not exceeding 200 sq in cross-sectional area, or 18 inches in width, or 10,000 lbs. in weight per piece.
5. Compositions apply to following products: Hot rolled and cold finished steel bars; semifinished steel products for forging; hot rolled and cold rolled sheets; hot rolled and cold rolled strip; mechanical tubing can be supplied in certain alloy compositions subject to negotiation.
6. The phosphorus and sulphur limitations for each process are as follows:
   Basic electric furnace.....0.025 per cent maximum
   Basic open hearth .....0.040 per cent maximum
   Acid electric furnace .....0.050 per cent maximum
   Acid open hearth .....0.050 per cent maximum
7. Minimum silicon limit for acid open hearth or acid electric furnace alloy steel is 0.15 per cent.
8. Small quantities of certain elements are present in alloy steel which are not specified or required. These elements are considered as incidental and may be present to the following maximum amounts: Copper, 0.35 per cent; nickel, 0.25 per cent; chromium, 0.20 per cent and molybdenum, 0.06 per cent.
9. Where minimum and maximum sulphur content is shown it is indicative of resulphurized steel.

H-STEELS

Chemical Composition Ranges and Limits Include Standard, Tentative Standard (TS) and Boron H-Steels

SAE or AISI NUMBER	C	Mn	Si	Ni	Cr	Mo
1330–H	0.27–0.33	1.45–2.05	0.20–0.35	.....	.....	.....
1335–H	0.32–0.38	1.45–2.05	0.20–0.35	.....	.....	.....
1340–H	0.37–0.44	1.45–2.05	0.20–0.35	.....	.....	.....
TS 14B35–H	0.32–0.38	0.65–1.10	0.20–0.35	.....	.....	.....
TS 14B50–H	0.47–0.54	0.65–1.10	0.20–0.35	.....	.....	.....
2515–H	0.12–0.18	0.30–0.70	0.20–0.35	4.70–5.30	.....	.....
2517–H	0.14–0.20	0.30–0.70	0.20–0.35	4.70–5.30	.....	.....
3120–H	0.17–0.23	0.50–0.90	0.20–0.35	1.00–1.45	0.45–0.85	.....
3130–H	0.27–0.33	0.50–0.90	0.20–0.35	1.00–1.45	0.45–0.85	.....
3135–H	0.32–0.38	0.50–0.90	0.20–0.35	1.00–1.45	0.45–0.85	.....
3140–H	0.37–0.44	0.60–1.00	0.20–0.35	1.00–1.45	0.45–0.85	.....
3310–H	0.07–0.13	0.30–0.70	0.20–0.35	3.20–3.80	1.30–1.80	.....
3316–H	0.13–0.19	0.30–0.70	0.20–0.35	3.20–3.80	1.30–1.80	.....
4032–H	0.29–0.35	0.60–1.00	0.20–0.35	.....	.....	0.20–0.30
4037–H	0.34–0.41	0.60–1.00	0.20–0.35	.....	.....	0.20–0.30
TS 40B37–H	0.34–0.41	0.60–1.00	0.20–0.35	.....	.....	0.08–0.15
4042–H	0.39–0.46	0.60–1.00	0.20–0.35	.....	.....	0.20–0.30
4047–H	0.44–0.51	0.60–1.00	0.20–0.35	.....	.....	0.20–0.30
4053–H	0.49–0.56	0.65–1.10	0.20–0.35	.....	.....	0.20–0.30
4063–H	0.59–0.69	0.65–1.10	0.20–0.35	.....	.....	0.20–0.30
4068–H	0.62–0.72	0.65–1.10	0.20–0.35	.....	.....	0.20–0.30
4118–H	0.17–0.23	0.60–1.00	0.20–0.35	.....	0.30–0.70	0.08–0.15
4130–H	0.27–0.33	0.30–0.70	0.20–0.35	.....	0.75–1.20	0.15–0.25
TS 4130–H	0.27–0.33	0.35–0.75	0.20–0.35	.....	0.85–1.30	0.08–0.15
TS 4132–H	0.29–0.35	0.35–0.75	0.20–0.35	.....	0.85–1.30	0.08–0.15
4135–H	0.32–0.38	0.60–1.00	0.20–0.35	.....	0.75–1.20	0.15–0.25
4137–H	0.34–0.41	0.60–1.00	0.20–0.35	.....	0.75–1.20	0.15–0.25
TS 4137–H	0.34–0.41	0.65–1.10	0.20–0.35	.....	0.85–1.30	0.08–0.15
4140–H	0.37–0.44	0.65–1.10	0.20–0.35	.....	0.75–1.20	0.15–0.25
TS 4140–H	0.37–0.44	0.70–1.20	0.20–0.35	.....	0.85–1.30	0.08–0.15
4142–H	0.39–0.46	0.65–1.10	0.20–0.35	.....	0.75–1.20	0.15–0.25
TS 4142–H	0.39–0.46	0.70–1.20	0.20–0.35	.....	0.85–1.30	0.08–0.15
4145–H	0.42–0.49	0.65–1.10	0.20–0.35	.....	0.75–1.20	0.15–0.25
TS 4145–H	0.42–0.49	0.70–1.20	0.20–0.35	.....	0.85–1.30	0.08–0.15
4147–H	0.44–0.51	0.65–1.10	0.20–0.35	.....	0.75–1.20	0.15–0.25
4150–H	0.47–0.54	0.65–1.10	0.20–0.35	.....	0.75–1.20	0.15–0.25
TS 4150–H	0.47–0.54	0.70–1.20	0.20–0.35	.....	0.85–1.30	0.08–0.15
4320–H	0.17–0.23	0.40–0.70	0.20–0.35	1.55–2.00	0.35–0.65	0.20–0.30
4337–H	0.34–0.41	0.55–0.90	0.20–0.35	1.55–2.00	0.65–0.95	0.20–0.30
4340–H	0.37–0.44	0.55–0.90	0.20–0.35	1.55–2.00	0.65–0.95	0.20–0.30
E4340–H	0.37–0.44	0.60–0.95	0.20–0.35	1.55–2.00	0.65–0.95	0.20–0.30
TS 46B12–H	0.09–0.15	0.35–0.75	0.20–0.35	1.55–2.00	.....	0.20–0.30
4620–H	0.17–0.23	0.35–0.75	0.20–0.35	1.55–2.00	.....	0.20–0.30
X4620–H	0.17–0.23	0.40–0.80	0.20–0.35	1.55–2.00	.....	0.20–0.30
4621–H	0.17–0.23	0.60–1.00	0.20–0.35	1.55–2.00	.....	0.20–0.30
4640–H	0.37–0.44	0.50–0.90	0.20–0.35	1.55–2.00	.....	0.20–0.30
TS 4720–H	0.17–0.23	0.45–0.75	0.20–0.35	0.85–1.25	0.30–0.60	0.15–0.25
4812–H	0.09–0.15	0.30–0.70	0.20–0.35	3.20–3.80	.....	0.20–0.30
4815–H	0.12–0.18	0.30–0.70	0.20–0.35	3.20–3.80	.....	0.20–0.30
4817–H	0.14–0.20	0.30–0.70	0.20–0.35	3.20–3.80	.....	0.20–0.30
4820–H	0.17–0.23	0.40–0.80	0.20–0.35	3.20–3.80	.....	0.20–0.30
TS 50B46–H	0.43–0.50	0.65–1.10	0.20–0.35	.....	0.13–0.43	.....
TS 50B60–H	0.55–0.65	0.65–1.10	0.20–0.35	.....	0.30–0.70	.....
5120–H	0.17–0.23	0.60–1.00	0.20–0.35	.....	0.60–1.00	.....
5130–H	0.27–0.33	0.60–1.00	0.20–0.35	.....	0.75–1.20	.....
5132–H	0.29–0.35	0.50–0.90	0.20–0.35	.....	0.65–1.10	.....
5135–H	0.32–0.38	0.50–0.90	0.20–0.35	.....	0.70–1.15	.....
5140–H	0.37–0.44	0.60–1.00	0.20–0.35	.....	0.60–1.00	.....
5145–H	0.42–0.49	0.60–1.00	0.20–0.35	.....	0.60–1.00	.....
5147–H	0.45–0.52	0.60–1.05	0.20–0.35	.....	0.80–1.25	.....
5150–H	0.47–0.54	0.60–1.00	0.20–0.35	.....	0.60–1.00	.....
5152–H	0.48–0.55	0.60–1.00	0.20–0.35	.....	0.85–1.30	.....
5160–H	0.55–0.65	0.65–1.10	0.20–0.35	.....	0.60–1.00	.....
TS 51B60–H	0.55–0.65	0.65–1.10	0.20–0.35	.....	0.60–1.00	.....
						V
6120–H	0.17–0.23	0.60–1.00	0.20–0.35	.....	0.60–1.00	0.10 Min.
6145–H	0.42–0.49	0.60–1.00	0.20–0.35	.....	0.75–1.20	0.15 Min.
6150–H	0.47–0.54	0.60–1.00	0.20–0.35	.....	0.75–1.20	0.15 Min.
						Mo
TS 8122–H	0.19–0.25	0.60–0.95	0.20–0.35	0.15–0.45	0.25–0.55	0.08–0.15
TS 81B40–H	0.37–0.44	0.70–1.05	0.20–0.35	0.15–0.45	0.30–0.60	0.08–0.15
TS 81B45–H	0.42–0.49	0.70–1.05	0.20–0.35	0.15–0.45	0.30–0.60	0.08–0.15
8617–H	0.14–0.20	0.60–0.95	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
TS 8617–H	0.14–0.20	0.60–0.95	0.20–0.35	0.25–0.65	0.50–0.80	0.08–0.15
8620–H	0.17–0.23	0.60–0.95	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
TS 8620–H	0.17–0.23	0.60–0.95	0.20–0.35	0.25–0.65	0.50–0.80	0.08–0.15
8622–H	0.19–0.25	0.60–0.95	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
TS 8622–H	0.19–0.25	0.60–0.95	0.20–0.35	0.25–0.65	0.50–0.80	0.08–0.15
8625–H	0.22–0.28	0.60–0.95	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
TS 8625–H	0.22–0.28	0.60–0.95	0.20–0.35	0.25–0.65	0.50–0.80	0.08–0.15
8627–H	0.24–0.30	0.60–0.95	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
TS 8627–H	0.24–0.30	0.60–0.95	0.20–0.35	0.25–0.65	0.50–0.80	0.08–0.15
8630–H	0.27–0.33	0.60–0.95	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
8635–H	0.32–0.38	0.70–1.05	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
8637–H	0.34–0.41	0.70–1.05	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
8640–H	0.37–0.44	0.70–1.05	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
8641–H*	0.37–0.44	0.70–1.05	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
8642–H	0.39–0.46	0.70–1.05	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
8645–H	0.42–0.49	0.70–1.05	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
86B45–H**	0.42–0.49	0.70–1.06	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
8650–H	0.47–0.54	0.70–1.05	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
8653–H	0.49–0.56	0.70–1.05	0.20–0.35	0.35–0.75	0.50–0.85	0.15–0.25
8655–H	0.50–0.60	0.70–1.05	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
8660–H	0.55–0.65	0.70–1.05	0.20–0.35	0.35–0.75	0.35–0.65	0.15–0.25
8720–H	0.17–0.23	0.60–0.95	0.20–0.35	0.35–0.75	0.35–0.65	0.20–0.30
8740–H	0.37–0.44	0.70–1.05	0.20–0.35	0.35–0.75	0.35–0.65	0.20–0.30
8742–H	0.39–0.46	0.70–1.05	0.20–0.35	0.35–0.75	0.35–0.65	0.20–0.30
8750–H	0.47–0.54	0.70–1.05	0.20–0.35	0.35–0.75	0.35–0.65	0.20–0.30
9260–H	0.55–0.65	0.65–1.10	1.70–2.20	.....	.....	.....
9261–H	0.55–0.65	0.65–1.10	1.70–2.20	.....	0.05–0.35	.....
9262–H	0.55–0.65	0.65–1.10	1.70–2.20	.....	0.20–0.50	.....
9310–H	0.07–0.13	0.40–0.70	0.20–0.35	2.95–3.55	1.00–1.45	0.08–0.15
TS 94B17–H	0.14–0.20	0.70–1.05	0.20–0.35	0.25–0.65	0.25–0.55	0.08–0.15
9840–H	0.37–0.44	0.60–0.95	0.20–0.35	0.80–1.20	0.65–0.95	0.20–0.30
9850–H	0.47–0.54	0.60–0.95	0.20–0.35	0.80–1.20	0.65–0.95	0.20–0.30

Source—American Iron & Steel Institute—1954

*Sulphur content 0.040–0.060 per cent

**Grade 86B45–H is a standard steel

NOTES

1. TS denotes tentative standard steels.
2. Boron steels indicated by B can be expected to have 0.0005 per cent minimum boron content.
3. Notes 4, 6, 7 and 8 on Alloy Steels apply to H–Steels.
4. Chemical composition ranges of steels ordered to end-quench hardenability are somewhat wider than the ranges applicable to the same grades when specified only to chemical composition. Wider ranges are necessary to adjust individual plant melting characteristics which might otherwise influence the levels and widths of the bands.

TITANIUM

Mechanical Properties of Titanium and Titanium Alloys

(Compositions and properties given are nominal unless otherwise indicated)

Material	Producer	Composition	Tensile Strength Psi	Yield Strength Psi	% Elong. In 2 Inches
RS-55	Republic Steel Corp.	99+% Ti; 0.20 C Max	73,000	62,000	25
A-55	Rem-Cru Titanium Inc.	99+% Ti; 0.20 C	65,000 (min)	55,000 (min)	20 (min)
Ti-75A	Titanium Metals Corp.	99+% Ti; 0.20 Fe; 0.10 N; Trace O	80,000 (min)	70,000 (min)	20 (min)
RS-70	Republic Steel Corp.	99+% Ti; 0.20 C	87,000	78,000	18
*MST Grade III Arc Melted	Mallory-Sharon Titanium Corp.	99+% Ti; 0.1 C Max	85,000	75,000	22
A-70	Rem-Cru Titanium Inc.	99+% Ti; 0.20 C	80,000 (min)	70,000 (min)	15 (min)
Ti-100A	Titanium Metals Corp.	99+% Ti; 0.07 C Max; 0.30 Fe	100,000 (min)	90,000 (min)	15 (min)
RS-70A	Republic Steel Corp.	98+% Ti; 0.20 C Max; 1.25 Mn Max	87,000	78,000	18
RS-110A	Republic Steel Corp.	91+% Ti; 7.0 Mn	127,000	118,000	16
RS-120	Republic Steel Corp.	91+% Ti; 7.0 Mn	132,000	124,000	18
C110-M	Rem-Cru Titanium Inc.	91+% Ti, 8.0 Mn	120,000 (min)	110,000 (min)	10 (min)
Ti-140A	Titanium Metals Corp.	93+% Ti; 2.0 Fe; 2.0 Cr; 2.0 Mo; 0.07 C; 0.10 N; 0.20 O	130,000 (min)	120,000 (min)	12 (min)
Ti-150A	Titanium Metals Corp.	95+% Ti; 0.07 C; 1.5 Fe; 0.10 N; 0.25 O; 2.7 Cr	130,000 (min)	120,000 (min)	12 (min)
C130-AM	Rem-Cru Titanium Inc.	91+% Ti; 4.0 Mn; 4.0 Al	140,000 (min)	130,000 (min)	10 (min)
MST Grade 8% Mn	Mallory-Sharon Titanium Corp.	92% Ti; 7 to 9 Mn	135,000	120,000	12
A-110 AT	Rem-Cru Titanium Inc.	92% Ti; 5 Al; 2.5 Sn	115,000 (min)	110,000 (min)	10
Ti-155A	Titanium Metals Corp.	88+% Ti; 1.2 Fe; 1.4 Mo; 1.4 Cr; 5.0 Al; 0.1 C; 0.1 N; 0.03 O	145,000 (min)	140,000 (min)	12 (min)
MST Grade 3% Al, 5 Cr Alloy	Mallory-Sharon Titanium Corp.	2.5 to 3.5% Al; 4.5 to 5.5 Cr	150,000	140,000	12
MST Grade 4% Mn, 4% Al Alloy	Mallory-Sharon Titanium Corp.	3.5 to 4.5% Mn; 3.5 to 4.5 Al	140,000	130,000	12
MST Grade Fe—Cr—O Alloy	Mallory-Sharon Titanium Corp.	1.2 to 1.8% Fe; 2.4 to 2.8 Cr; 0.2 O	140,000	120,000	12
MST Grade Fe—Cr—Mo Alloy	Mallory-Sharon Titanium Corp.	2% Fe; 2 Cr; 2 Mo	140,000	120,000	12
MST Grade Al—Fe—Cr—Mo Alloy	Mallory-Sharon Titanium Corp.	6% Al; 2 Fe; 2 Cr; 2 Mo	150,000	140,000	10
**MST Grade 3 Mn Complex	Mallory-Sharon Titanium Corp.	3% Mn; 1 Fe; 1 Cr; 1 V; 1 Mo	130,000 to 190,000	130,000 to 160,000	10 to 20

*Commercially-pure, can tailor properties to specifications.

**Heat-treatable alloy, with properties depending on heat treatment.

ALUMINUM

Producer Designations of Aluminum Alloys, Chemical Compositions and Principal Forms

Aluminum Co. of America	Reynolds Metals Company	Kaiser Aluminum & Chemical Co.	Typical Composition	Description and Principal Uses
EC	EC	EC	Al 99.5 Min; Si .30 Max; Mn .03 Max; Cu .05 Max; Mg .03 Max; Ni .03 Max; Zn .03 Max; Fe .40 Max	Electrolytic Conductor Metal
2S	2S	2S	Al 99.0 Min; Mn .10 Max; Cu .20 Max; Zn .10 Max; Fe + Si 1.0 Max	Wrought Alloy
3S	3S	3S	Al Rem; Si .60 Max; Mn 1.0 Min, 1.5 Max; Cu .20 Max; Zn .10 Max; Fe .70 Max	Wrought Alloy
Alclad 3S	Alclad 3S	Clad 3S	Al Rem; Si .60 Max; Mn 1.0 Min, 1.5 Max; Cu .20 Max; Zn .10 Max; Fe .70 Max (Core)	Wrought Alloy
			Al Rem; Mn .10 Max; Cu .10 Max; Zn .75 Min, 1.25 Max; Fe + Si .70 Max (Coating)	Wrought Alloy
4S	4S	4S	Al Rem; Si .30 Max; Mn 1.0 Min, 1.5 Max; Cu .20 Max; Mg .80 Min, 1.3 Max; Zn .10 Max; Fe .70 Max	Wrought Alloy
Alclad 4S	Alclad 4S	Clad 4S	Al Rem; Si .30 Max; Mn 1.0 Min, 1.5 Max; Cu .20 Max; Mg .80 Min, 1.3 Max; Zn .10 Max; Fe .70 Max (Core)	Wrought Alloy
			Al Rem; Mn .10 Max; Cu .10 Max; Zn .75 Min, 1.25 Max; Fe + Si .70 Max (Coating)	Wrought Alloy
11S	11S	11S	Al Rem; Si .40 Max; Cu 5.0 Min, 6.0 Max; Pb .20 Min, .60 Max; Bi .20 Min, .60 Max; Zn .30 Max; Fe .70 Max	Wrought Alloy
	12		Al Rem; Si 1.0 Min, 4.0 Max; Mn .50 Max; Cu 6.0 Min, 8.0 Max; Mg .07 Max; Ni .30 Max; Zn 1.1 Min, 2.5 Max; Ti .20 Max; Fe 1.2 Max	Die Casting Alloy
13	13	13	Al Rem; Si 11.0 Min, 13.0 Max; Mn .30 Max; Cu .60 Max; Mg .10 Max; Ni .50 Max; Zn .50 Max; Sn .10 Max; Fe 2.0 Max	Die Casting Alloy
	A13		Al Rem; Si 11.5 Min, 12.5 Max; Mn .05 Max; Cu .10 Max; Mg .03 Max; Ni .05 Max; Zn .05 Max; Fe .60 Max; Sn .05 Max	Die Casting Alloy
14S	14S	14S	Al Rem; Si .50 Min, 1.2 Max; Mn .40 Min, 1.2 Max; Cu 3.9 Min, 5.0 Max; Mg .20 Min, .80 Max; Zn .25 Max; Cr .10 Max; Fe 1.0 Max	Wrought Alloy
Alclad 14S	R301	Clad 14S	Al Rem; Si .50 Min, 1.2 Max; Mn .40 Min, 1.2 Max; Cu 3.9 Min, 5.0 Max; Mg .20 Min, .80 Max; Zn .25 Max; Cr .10 Max; Fe 1.0 Max (Core)	Wrought Alloy
			Al Rem; Si Min, .45xMg. Max .65xMg; Cu .10 Max; Mg 1.1 Min, 1.4 Max; Ti .15 Max; Zn .10 Max; Cr .15 Min, .35 Max; Fe .35 Max (Coating)	Wrought Alloy
17S	17S	17S	Al Rem; Si .80 Max; Mn .40 Min, 1.0 Max; Cu 3.5 Min, 4.5 Max; Mg .20 Min, .80 Max; Zn .25 Max; Cr .25 Max; Fe 1.0 Max	Wrought Alloy
A17S	A17S	A17S	Al 95.0 Min; Si .80 Max; Mn .20 Max; Cu 2.2 Min, 3.0 Max; Mg .20 Min, .50 Max; Zn .10 Max; Cr .25 Max; Fe 1.0 Max	Wrought Alloy
18S	18S	18S	Al Rem; Si .90 Max; Mn .20 Max; Cu 3.5 Min, 4.5 Max; Mg .45 Min, .90 Max; Ni 1.7 Min, 2.3 Max; Zn .25 Max; Cr .10 Max; Fe 1.0 Max; Ti .05 Max	Wrought Alloy
	F18S		Al Rem; Cu 2.2 Max; Mg 1.6 Max; Ni 1.1 Max; Fe 1.1 Max; Ti .07 Max	Wrought Alloy
B18S	B18S	B18S	Al Rem; Si .90 Max; Mn .20 Max; Cu 3.5 Min, 4.5 Max; Mg 1.2 Min, 1.8 Max; Ni 1.7 Max; Zn .25 Max; Cr .10 Max; Fe 1.0 Max	Wrought Alloy
24S	24S	24S	Al Rem; Si .50 Max; Mn .30 Min, .90 Max; Cu 3.8 Min, 4.9 Max; Mg 1.2 Min, 1.8 Max; Zn .10 Max; Cr .25 Max; Fe .50 Max	Wrought Alloy
Alclad 24S	Alclad 24S	Clad 24S	Al Rem; Si .50 Max; Mn .30 Min, .90 Max; Cu 3.8 Min, 4.9 Max; Mg 1.2 Min, 1.8 Max; Zn .10 Max; Cr .25 Max; Fe .50 Max (Core)	Wrought Alloy
			Al 99.3 Min. (Coating)	Wrought Alloy
25S	25S	25S	Al Rem; Si .50 Min, 1.2 Max; Mn .40 Min, 1.2 Max; Cu 3.9 Min, 5.0 Max; Mg .05 Max; Ti .15 Max; Zn .25 Max; Cr .10 Max; Fe 1.0 Max	Wrought Alloy
32S	32S	32S	Al Rem; Si 11.0 Min, 13.5 Max; Cu .50 Min, 1.3 Max; Mg .80 Min, 1.3 Max; Ni .50 Min, 1.3 Max; Zn .25 Max; Cr .10 Max; Fe 1.0 Max; Ti .05 Max	Wrought Alloy
43S	43S	43S	Al Rem; Si 4.5 Min, 6.0 Max; Mn .30 Max; Cu .25 Max; Mg .05 Max; Ti .20 Max; Zn .30 Max; Fe .80 Max	Wrought Alloy
43	43	43	Al Rem; Si 4.5 Min, 6.0 Max; Mn .30 Max; Cu .60 Max; Mg .10 Max; Ni .50 Max; Zn .50 Max; Fe 2.0 Max; Sn .10 Max	Casting Alloy
50S	50S	50S	Al Rem; Si .40 Max; Mn .15 Max; Cu .25 Max; Mg 1.0 Min, 1.6 Max; Zn .25 Max; Cr .10 Max; Fe .70 Max	Wrought Alloy
	R305	K155	Al Rem; Si .40 Max; Mn .20 Max; Cu .20 Max; Mg .50 Min, 1.1 Max; Zn .25 Max; Fe .70 Max; Cr .10 Max	Wrought Alloy
A50S			Al Rem; Si .30 Max; Mn .10 Max; Cu .20 Max; Mg .50 Min, 1.1 Max; Zn .10 Max; Fe .70 Max	Wrought Alloy
A51S	A51S	A51S	Al Rem; Si .60 Min, 1.2 Max; Mn .20 Max; Cu .35 Max; Mg .45 Min, .80 Max; Ti .15 Max; Zn .25 Max Cr .15 Min, .35 Max; Fe 1.0 Max	Wrought Alloy
	J51S		Al Rem; Si .20 Min, .50 Max; Cu .15 Min, .40 Max; Mg .40 Min, .80 Max; Zn .20 Max; Fe .80 Max	Wrought Alloy
52S	52S	52S	Al Rem; Mn .10 Max; Cu .10 Max; Mg 2.2 Min, 2.8 Max; Zn .10 Max; Cr .15 Min, .35 Max; Fe + Si .45 Max	Wrought Alloy

Aluminum Co. of America	Reynolds Metals Company	Kaiser Aluminum & Chemical Co.	Typical Composition	Description and Principal Uses
53S	53S	53S	Al Rem; Si Min .45xMg, Max .65xMg; Cu .10 Max; Mg 1.1 Min, 1.4 Max; Ti .15 Max; Zn .10 Max; Cr .15 Min, .35 Max; Fe .35 Max	Wrought Alloy
A54S	A54S		Al Rem; Mn .10 Max; Cu .10 Max; Mg 3.1 Min, 3.9 Max; Zn .20 Max; Ti .20 Max; Cr .15 Min, .35 Max; Be .0005 Max	Wrought Alloy
	Alclad 55S		Al Rem; Si .30 Max; Mn .30 Min, .80 Max; Cu .25 Max; Mg 4.0 Min, 5.0 Max; Zn .25 Max; Fe .70 Max; Cr .25 Max	Wrought Alloy
56S	56S	56S	Al Rem; Si .30 Max; Mn .05 Min, .20 Max; Cu .10 Max; Mg 4.5 Min, 5.6 Max; Zn .10 Max; Cr .05 Min, .20 Max; Fe .40 Max	Wrought Alloy
C57S	C57S		Al Rem; Si .12 Max; Mn .15 Min, .45 Max; Cu .07 Max; Mg .80 Min, 1.2 Max; Fe .17 Max	Wrought Alloy
61S	61S	61S	Al Rem; Si .40 Min, .80 Max; Mn .15 Max; Cu .15 Min, .40 Max; Mg .80 Min, 1.2 Max; Ti .15 Max; Zn .20 Max; Cr .15 Min, .35 Max; Fe .70 Max	Wrought Alloy
62S	62S	62S	Al Rem; Si .40 Min, .80 Max; Mn .10 Max; Cu .15 Min, .40 Max; Mg .80 Min, 1.2 Max; Zn .20 Max; Ti .15 Max; Fe .70 Max; Cr .15 Max	Wrought Alloy
63S	63S	63S	Al Rem; Si .20 Min, .60 Max; Mn .10 Max; Cu .10 Max; Mg .45 Min, .90 Max; Ti .10 Max; Zn .10 Max; Cr .10 Max; Fe .35 Max	Wrought Alloy
72S	72S	72S	Al Rem; Mn .10 Max; Cu .10 Max; Zn .80 Min, 1.30 Max; Fe + Si .70 Max; Mg .10 Max	Wrought Alloy
75S	75S	75S	Al Rem; Si .50 Max; Mn .30 Max; Cu 1.2 Min, 2.0 Max; Mg 2.1 Min, 2.9 Max; Ti .20 Max; Zn 5.1 Min, 6.1 Max; Cr .18 Min, .40 Max; Fe .70 Max	Wrought Alloy
Alclad 75S	Alclad 75S	Clad 75S	Al Rem; Si .50 Max; Mn .30 Max; Cu 1.2 Min, 2.0 Max; Mg 2.1 Min, 2.9 Max; Ti .20 Max; Zn 5.1 Min, 6.1 Max; Cr .18 Min, .40 Max; Fe .70 Max (Core)	Wrought Alloy
			Al Rem; Mn .10 Max; Cu .10 Max; Zn .75 Min, 1.25 Max; Fe + Si .70 Max (Coating)	Wrought Alloy
85	85	85	Al Rem; Si 4.5 Min, 5.5 Max; Mn .50 Max; Cu 3.0 min, 4.5 Max; Mg .10 Max; Ni .50 Max; Zn 1.0 Max; Sn .30 Max; Fe 2.0 Max	Die Casting Alloy
108	108	108	Al Rem; Si 2.5 Min, 3.5 Max; Mn .30 Max; Cu 3.5 Min, 4.5 Max; Mg .03 Max; Ti .20 Max; Zn .20 Max; Fe 1.00 Max	Sand Casting Alloy
A108	A108	A108	Al Rem; Si 5.0 Min, 6.0 Max; Mn .30 Max; Cu 4.0 Min, 5.0 Max; Mg .10 Max; Zn .50 Max; Fe 1.0 Max; Ti .20 Max	Permanent Mold Casting Alloy
112	112	112	Al Rem; Si 1.0 Max; Mn .50 Max; Cu 6.0 Min, 8.0 Max; Mg .07 Max; Ni .30 Max; Zn 2.2 Max; Ti .20 Max; Fe 1.5 Max	Sand Casting Alloy
113	113	113	Al Rem; Si 1.0 Min, 3.0 Max; Mn .50 Max; Cu 6.0 Min, 8.0 Max; Mg .07 Max; Ni .30 Max; Zn 2.2 Max; Ti .20 Max; Fe 1.4 Max	Sand Casting Alloy
C113	C113	C113	Al Rem; Si 3.0 Min, 4.0 Max; Mn .50 Max; Cu 6.0 Min, 8.0 Max; Mg .30 Max; Ni .50 Max; Zn 2.5 Max; Ti .20 Max; Fe 1.5 Max	Permanent Mold Casting Alloy
122	122	122	Al Rem; Si 1.0 Max; Mn .50 Max; Cu 9.2 Min, 10.8 Max; Mg .15 Min, .35 Max; Ni .30 Max; Zn .50 Max; Ti .20 Max; Fe 1.5 Max	Sand & Permanent Mold Casting Alloy
A132	A132	A132	Al Rem; Si 11.0 Min, 13.0 Max; Mn .10 Max; Cu .50 Min, 1.5 Max; Mg .70 Min, 1.3 Max; Ni 2.0 Min, 3.0 Max; Zn .10 Max; Ti .20 Max; Fe 1.3 Max	Permanent Mold Casting Alloy
D132	D132	D132	Al Rem; Si 8.5 Min, 10.5 Max; Mn .50 Max; Cu 2.0 Min, 4.0 Max; Mg .50 Min, 1.5 Max; Ni .50 Min, 1.5 Max; Zn .50 Max; Ti .20 Max; Fe 1.2 Max	Permanent Mold Casting Alloy
138	138	138	Al Rem; Si 3.5 Min, 4.5 Max; Mn .50 Max; Cu 9.5 Min, 10.5 Max; Mg .15 Min, .35 Max; Ni .50 Max; Zn .50 Max; Ti .20 Max; Fe 1.5 Max	Permanent Mold Casting Alloy
142	142	142	Al Rem; Si .60 Max; Mn .10 Max; Cu 3.5 Min, 4.5 Max; Mg 1.2 Min, 1.8 Max; Ni 1.7 Min, 2.3 Max; Zn .10 Max; Fe .80 Max; Ti .20 Max	Sand & Permanent Mold Casting Alloy
195	195	195	Al Rem; Si 1.2 Max; Mn .30 Max; Cu 4.0 Min, 5.0 Max; Mg .03 Max; Ti .20 Max; Zn .30 Max; Fe 1.0 Max	Sand Casting Alloy
B195	B195	B195	Al Rem; 2.0 Min, 3.0 Max; Mn .30 Max; Cu 4.0 Min, 5.0 Max; Mg .03 Max; Zn .30 Max; Ti .20 Max; Fe 1.0 Max	Permanent Mold Casting Alloy
212	212	212	Al Rem; Si 1.0 Min, 1.5 Max; Mn .30 Max; Cu 7.0 Min, 8.5 Max; Mg .05 Max; Ti .20 Max; Zn .20 Max; Fe 1.4 Max	Sand Casting Alloy
214	214	214	Al Rem; Si .30 Max; Mn .30 Max; Cu .10 Max; Mg 3.5 Min, 4.5 Max; Ti .20 Max; Zn .10 Max; Fe .40 Max	Sand Casting Alloy
A214	A214	A214	Al Rem; Si .30 Max; Mn .30 Max; Cu .10 Max; Mg 3.5 Min, 4.5 Max; Ti .20 Max; Zn 1.4 Min, 2.2 Max; Fe .40 Max	Permanent Mold Casting Alloy
B214	B214	B214	Al Rem; Si 1.4 Min, 2.2 Max; Mn .30 Max; Cu .10 Max; Mg 3.5 Min, 4.5 Max; Zn .10 Max; Ti .20 Max; Fe .40 Max	Sand Casting Alloy
	C214		Al Rem; Si .30 Max; Mn .40 Min, .60 Max; Cu .10 Max; Mg 3.5 Min, 4.5 Max; Zn .10 Max; Fe .80 Max	Wrought Alloy
F214	F214	F214	Al Rem; Si .30 Min, .70 Max; Mn .30 Max; Cu .10 Max; Mg 3.5 Min, 4.5 Max; Zn .10 Max; Ti .20 Max; Fe .40 Max	Sand Casting Alloy

Aluminum Co. of America	Reynolds Metals Company	Kaiser Aluminum & Chemical Co.	Typical Composition	Description and Principal Uses
	L214		Al Rem; Si .50 Min, 1.0 Max; Mn .40 Min, .60 Max; Cu .10 Max; Mg 2.5 Min, 4.0 Max; Ni .10 Max; Zn .10 Max; Fe .60 Min, .90 Max; Sn .10 Max	Wrought Alloy
218	218	218	Al Rem; Si .30 Max; Mn .30 Max; Cu .20 Max; Mg 7.5 Min, 8.5 Max; Ni .10 Max; Zn .10 Max; Sn .10 Max; Fe 1.8 Max	Die Casting Alloy
220	220	220	Al Rem; Si .20 Max; Mn .10 Max; Cu .20 Max; Mg 9.5 Min, 10.6 Max; Zn .10 Max; Fe .30 Max	Sand Casting Alloy
319	319	319	Al Rem; Si 5.5 Min, 7.0 Max; Mn .80 Max; Cu 3.0 Min, 4.5 Max; Mg .50 Max; Ni .50 Max; Zn 1.0 Max; Ti .20 Max; Fe 1.2 Max	Sand Casting Alloy
	A319		Al Rem; Si 5.5 Min, 7.0 Max; Mn .50 Max; Cu 3.0 Min, 4.5 Max; Mg .10 Max; Ni .20 Max; Zn .80 Max; Fe .80 Max; Ti .20 Max	Die Casting Alloy
333	333	333	Al Rem; Si 8.0 Min, 10.0 Max; Mn .80 Max; Cu 3.0 Min, 4.5 Max; Mg .60 Max; Ni .50 Max; Zn 1.0 Max; Ti .20 Max; Fe 1.2 Max	Permanent Mold Casting Alloy
355	355	355	Al Rem; Si 4.5 Min, 5.5 Max; Mn .30 Max; Cu 1.0 Min, 1.5 Max; Mg .40 Min, .60 Max; Ti .20 Max; Zn .20 Max; Fe .60 Max*	Sand & Permanent Mold Casting Alloy
356	356	356	Al Rem; Si 6.5 Min, 7.5 Max; Mn .10 Max; Cu .20 Max; Mg .20 Min, .40 Max; Ti .20 Max; Zn .20 Max; Fe .50 Max	Sand & Permanent Mold Casting Alloy
360	360	360	Al Rem; Si 9.0 Min, 10.0 Max; Mn .30 Max; Cu .60 Max; Mg .40 Min, .60 Max; Ni .50 Max; Zn .50 Max; Fe 2.0 Max; Sn .10 Max	Die Casting Alloy
A360	A360	A360	Al Rem; Si 9.0 Min, 10.0 Max; Mn .30 Max; Cu .60 Max; Mg .40 Min, .60 Max; Ni .50 Max; Zn .50 Max; Fe 1.3 Max; Sn .10 Max	Die Casting Alloy
380	380	380	Al Rem; Si 7.5 Min, 9.5 Max; Mn .50 Max; Cu 3.0 Min, 4.0 Max; Mg .10 Max; Ni .50 Max; Zn 1.0 Max; Fe 2.0 Max; Sn .30 Max	Die Casting Alloy
A380	A380	A380	Al Rem; Si 7.5 Min, 9.5 Max; Mn .50 Max; Cu 3.0 Min, 4.0 Max; Mg .10 Max; Ni .50 Max; Zn 1.0 Max; Fe 1.3 Max; Sn .30 Max	Die Casting Alloy
	382		Al Rem; Si 3.0 Min, 4.0 Max; Mn .10 Max; Cu .10 Max; Mg 1.7 Min, 2.5 Max; Fe .40 Max; Ti .20 Max; Cr .20 Max	Die Casting Alloy
384	384	384	Al Rem; Si 11.0 Min, 13.0 Max; Mn .50 Max; Cu 2.0 Min, 4.0 Max; Mg .30 Max; Ni .50 Max; Zn 1.5 Max; Fe 2.0 Max; Sn .30 Max	Die Casting Alloy
A612	A612	A612	Al Rem; Si .15 Max; Mn .05 Max; Cu .35 Min, .65 Max; Mg .60 Min, .80 Max; Ti .20 Max; Zn 6.0 Min, 7.0 Max; Fe .50 Max	Sand Casting Alloy
C612	C612	C612	Al Rem; Si .30 Max; Mn .05 Max; Cu .35 Min, .65 Max; Mg .25 Min, .45 Max; Ti .20 Max; Zn 6.0 Min, 7.0 Max; Fe 1.4 Max	Permanent Mold Casting Alloy
750	750	750	Al Rem; Si .70 Max; Mn .10 Max; Cu .70 Min, 1.3 Max; Ni .70 Min, 1.3 Max; Ti .20 Max; Sn 5.5 Min, 7.0 Max; Fe .70 Max	Permanent Mold Casting Alloy

* When Fe exceeds .40 per cent, Mn shall not be less than ⅓ Fe content.

MAGNESIUM

Chemical Compositions and Characteristics of Magnesium Alloys

Dowmetal Alloy	ASTM Designation	Chemical Compositions	Form Produced	Characteristics
C	AZ92A	Mg Rem; Al 9.0; Mn 0.15; Zn 2.0	Sand and permanent mold castings.	Excellent strength & pressure tightness used in heat treated & aged condition where maximum yield strength is desired.
H	AZ63A	Mg Rem; Al 6.0; Mn 0.25; Zn 3.0	Sand and permanent mold castings.	Good toughness combined with excellent strength & elongation.
EK30A	EK30A	Mg. Rem; Rare Earths 3.0; Zr 0.55	Sand and permanent mold castings.	Intended for use at elevated temperatures (350-500° F). Good pressure tightness characteristics, used mostly in heated treated & artificially aged condition.
EZ33A	EZ33A	Mg Rem; Zn 3.0; Rare Earths 3.0; Zr 0.7	Sand and permanent mold castings.	Intended for use at elevated temperatures (350-500° F). Good pressure tightness characteristics, used mostly in the artificially aged condition.
HZ32XA		Mg Rem; Zn 2.0; Zr 0.7; Th 3.0	Sand and permanent mold castings.	Intended for use at elevated temperatures (650-700° F). Good pressure tightness characteristics, used mostly in the artificially aged condition.
AZ91C	AZ91C	Mg Rem; Al 9.0; Mn 0.15; Zn 1.0	Sand and permanent mold castings.	Excellent strength & pressure tightness. Used in applications requiring greater impact strength and elongation than C-T6.
R	AZ91A	Mg Rem; Al 9.0; Mn 0.20; Zn 0.6	Die casting.	Specification grade. Used for die castings of good strength and ductility. Good casting characteristics.
AZ91B	AZ91B	Mg Rem; Al 9.0; Mn 0.20; Zn 0.6	Die casting.	Standard grade. Used for die castings of good strength & ductility. Good casting characteristics.
FS1	AZ31A	Mg Rem; Al 3.0; Mn 0.45; Zn 1.0	Extrusions & sheet	Most commonly used alloy for extrusions and sheet. Good formability & weldability characteristics.
J1	AZ61A	Mg Rem; Al 6.5; Mn 0.20; Zn 1.0	Extrusions	Extrusion with improved strength over FS1—but with less formability.
M	M1A	Mg Rem; Mn 1.2	Extrusions & sheet	For use where strength requirements are not severe and where stress relief after welding is not possible.
ZK60Z	ZK60A	Mg Rem; Zn 5.7; Zr 0.55	Extrusions	Extrusions of highest strength used mostly in artificially aged condition. Good toughness.

COPPER

Standard Commercial Wrought Copper and Copper-base Alloys

Name	Nominal Composition Per Cent[1]	Forms Commonly Used[2]	Machinability Rating (free-cutting brass equals 100)	Hot Working Capacity	Cold Working Capacity
COPPERS:					
Electrolytic Tough Pitch	Cu 99.92; O 0.04	R,D,S,W,T	20	Excel.	Excel.
Deoxidized	Cu 99.94; P 0.02	R,D,S,T,	20	Excel.	Excel.
BRASSES—Nonleaded:					
Gilding, 95%	Cu 95; Zn 5	R,D,W	20	Good	Excel.
Commercial Bronze, 90%	Cu 90; Zn 10	R,D,W,T	20	Good	Excel.
Jewelry Bronze, 87.5%	Cu 87.5; Zn 12.5	R,W	30	Good	Excel.
Red Brass, 85%	Cu 85; Zn 15	R,D,W,T	30	Good	Excel.
Low Brass, 80%	Cu 80; Zn 20	R,D,W	30	Fair	Excel.
Cartridge Brass, 70%	Cu 70; Zn 30	R,D,W,T	30	Fair	Excel.
Yellow Brass	Cu 65; Zn 35	R,D,W	30	Poor	Excel.
Muntz Metal	Cu 60; Zn 40	R,D,W,T	40	Excel.	Fair
LEADED BRASSES:					
Leaded Commercial Bronze	Cu 89; Pb 1.75; Zn 9.25	D,S	80	Poor	Good
Low-leaded Brass (tube)	Cu 66; Pb 0.5; Zn 33.5	T	60	Poor	Excel.
Low-leaded Brass	Cu 65; Pb 0.5; Zn 34.5	R	60	Poor	Good
Medium-leaded Brass	Cu 65; Pb 1; Zn 34	R,D,S,W	70	Poor	Good
High-leaded Brass (tube)	Cu 66; Pb 1.6; Zn 32.4	T	80	Poor	Fair
High-leaded Brass	Cu 65; Pb 2.0; Zn 33.0	R,D	90	Poor	Fair
Extra-high-leaded Brass	Cu 63; Pb 2.5; Zn 34.5	R	100	Fair	Poor
Free-cutting Brass	Cu 61.5; Pb 3; Zn 35.5	D,S	100	Fair	Poor
Leaded Muntz Metal	Cu 60; Pb 0.6; Zn 39.4	R	60	Excel.	Fair
Free-cutting Muntz Metal	Cu 60; Pb 1; Zn 39	T	70	Excel.	Fair
Forging Brass	Cu 60; Pb 2; Zn 38	R,D,S	80	Excel.	Poor
Architectural Bronze	Cu 57; Pb 3; Zn 40	D,S	90	Excel.	Poor
TIN & ALUMINUM BRASSES:					
Inhibited Admiralty	Cu 71; Zn 28; Sn 1	R,W,T	30	Fair	Excel.
Naval Brass	Cu 60; Zn 39.25; Sn 0.75	**R,D,S,W,T**	30	Excel.	Fair
Leaded Naval Brass	Cu 60; Pb 1.75; Zn 37.5; Sn 0.75	D,S	70	Good	Poor
Manganese Bronze	Cu 58.5; Fe 1; Zn 39.2; Sn 1; Mn 0.3	R,D,S,W	30	Excel.	Poor
Aluminum Brass	Cu 76; Zn 22; Al 2	T	30	Fair	Excel.
Aluminum Bronze, 5%	Cu 95; Al 5	T	20	Fair	Excel.
PHOSPHOR BRONZES (TIN BRONZES):					
Phosphor Bronze, 5%	Cu 95; Sn 5	R,D,W,T	20	Poor	Excel.
Phosphor Bronze, 8%	Cu 92; Sn 8	R,D,W	20	Poor	Good
Phosphor Bronze, 10%	Cu 90; Sn 10	R,D,W	20	Poor	Good
Phosphor Bronze, 1.25%	Cu 98.75; Sn 1.25; P Trace	R	20	Good	Excel.
Free-cutting Phosphor Bronze	Cu 88; Pb 4; Zn 4; Sn 4	R,D	80	.....	Good
CUPRO-NICKEL & NICKEL SILVERS:					
Cupro-Nickel, 30%	Cu 70; Ni 30	R,D,T	20	Good	Good
Cupro-Nickel, 10%	Cu 88.7; Fe 1.3; Ni 10	R,T	20	.....	Good
Nickel Silver, 65–18	Cu 65; Zn 17; Ni 18	R,D,W	20	Poor	Excel.
Nickel Silver, 55–18	Cu 55; Zn 27; Ni 18	R,D,W	30	Poor	Good
Nickel Silver, 65–15	Cu 65; Zn 20; Ni 15	R	20	Poor	Excel.
Nickel Silver, 65–12	Cu 65; Zn 23; Ni 12	R,W	20	Poor	Excel.
Nickel Silver, 65–10	Cu 65; Zn 25; Ni 10	R,W	20	Poor	Excel.
SILICON BRONZES (Copper-Silicon Alloys):					
High-silicon Bronze	Cu 96; Si 3	R,D,S,W,T	30	Excel.	Excel.
Low-silicon Bronze	Cu 97.7; Si 1.5	R,D,S,W,T	30	Excel.	Excel.

Source: Copper & Brass Association Standards

1. Only major elements listed

2. Abbreviations: R—Rolled Flat Products; D—Rod and Drawn Flat Products; S—Shapes; W—Wire (except Flat); T—Tube

Compiled by

STEEL
THE WEEKLY MAGAZINE OF METALWORKING

LIKE TO HAVE REPRINTS? A limited number will be available. Please address requests to Readers Service Department, STEEL, Penton Building, Cleveland 13, O.

Kaiser Aluminum

Brooks & Perkins

K150, is already well known to the aluminum industry as 50S. A non-heat-treatable alloy having a nominal composition of 1.4 per cent Mg, remainder aluminum, it exhibits strengths which are intermediate between those of the corresponding tempers of 3S and 52S.

Its corrosion resistance is excellent, and its anodizing characteristics resemble those of 52S, but with a somewhat lighter tinge. 50S offers economic advantage over 52S where strength superior to 3S, coupled with excellent finishing characteristics, is required. It has also found wide use in the form of small diameter extruded and drawn tube.

New Addition—About a year ago K155, the second new member of the Al-Mg family, was introduced. Magnesium content was pegged at a level (0.9 per cent) which previous laboratory work had indicated would result in typical properties which would match those of 3S in practically every respect.

K155 is now firmly established. It replaces 3S in a wide variety of applications where its clear white anodized appearance is more attractive than the brownish tinge of 3S. It also replaces 50S in some applications where the latter has been stronger than necessary.

Uses—House trailer side panels, cook ware and trim on various home appliances are among the many items which have been fabricated from K155. When a low cost anodized sheet is required for use in conjunction with anodized 63S extrusions, K155 is found to be ideal, again because of its color.

A word of caution is necessary also. K155 and 3S are not interchangeable to the extent that both may be used in the same article if color match of anodic coatings is a factor.

Work Continues—Work on the Al-Mg-Mn alloys has not yet resulted in a commercial alloy although two members of the series are undergoing limited testing. These alloys are of the non-heat-treatable type and exhibit relatively high strengths in the annealed condition. They are thus well adapted to fabrication by welding.

Tensile strengths across welds which equal those usually obtained in low carbon structural steels have been obtained in independent laboratory tests. Alloys of this series, which will eventually be available in sheet, plate and extrusions, will permit the economical use of aluminum in unfired pressure vessels and structural weldments which are too large to heat treat after welding.

Magnesium Tops for Deep Draws

By J. S. KIRKPATRICK
Vice President, Brooks & Perkins Inc.

ALLOY of magnesium most commonly used for sheet metal fabricated parts and assemblies is AZ-31, which has a nominal composition of 3.0 per cent aluminum, 1.0 per cent zinc, and balance magnesium. In the annealed condition this alloy is comparable strengthwise with 52S-½ H aluminum.

The rare earth alloys, with their high strength at elevated temperatures, and other favorable characteristics have been used experimentally in recent months, and may well become important for some applications.

Pressure Containers—Increasingly, such equipment as pressurized containers for high altitude equipment is being designed in magnesium. Such air-seal cans usually are of arc-welded construction. Freedom of welded sheet and plate from microporosity, with magnesium's relatively high weld strength, makes it superior for such applications.

Machinability—The high machining speeds obtainable with magnesium, the lower power required for machining, and the uniformly smooth finish obtained without dragging or tearing, all combine to make machining of magnesium an extremely low-cost operation. In addition, magnesium castings are generally free from hard spots, pinholes, and other porosity which would result in scrap loss.

It is often unnecessary to grind or polish magnesium to obtain a smooth finish surface. Surface smoothness readings of 3 to 5 microinches have been obtained. One manufacturer reports that magnesium gears for use in electronic systems can be machined to much closer tolerances than can similar gears made from other materials. Due to its lower modulus of elasticity, magnesium cuts closer to size than most other alloys.

Deep Drawing—Alloys of magnesium when hot drawn can be drawn from three to four times as deep in one operation as those of other metals. This property makes it practical to fabricate in one piece a part which, if made from other metals, would usually be fabricated by riveting or welding several pieces together. One-operation deep drawing lends itself to more pleasing product design.

Two other important advantages of single draws with magnesium are the elimination of all intermediate anneals, and the need for one set of draw dies.

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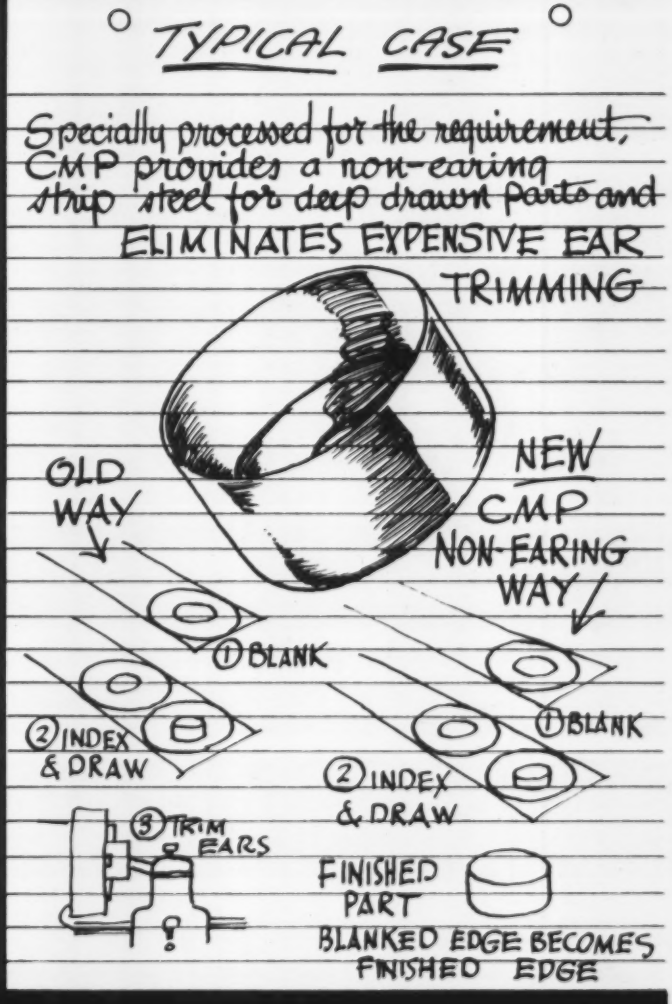
COLD ROLLED STRIP STEEL

OFFERS
a practical way
to reduce end-product costs
WITHOUT CAPITAL INVESTMENT

Having ear trouble? If your drawn product requires trimming to remove ears or scallops, you may be able to reduce your end-product cost by the use of CMP non-earing (non-scalloping) cold rolled strip steel.

This is one of many ways in which CMP engineers specifications and processing methods to enable strip steel users to produce better products at lower cost.

Perhaps we can help you to reduce end-product cost without capital investment.


TYPICAL CASE
Specially processed for the requirement, CMP provides a non-earing strip steel for deep drawn parts and
ELIMINATES EXPENSIVE EAR TRIMMING
OLD WAY
NEW CMP NON-EARING WAY
1 BLANK
2 INDEX & DRAW
3 TRIM EARS
1 BLANK
2 INDEX & DRAW
FINISHED PART
BLANKED EDGE BECOMES FINISHED EDGE

PRECISION COLD ROLLED CMP STRIP STEEL

MAY 17-20, 1954 • CHICAGO
BASIC MATERIALS EXPOSITION
THE PRODUCT DEVELOPMENT SHOW

DON'T MISS BOOTHS 707 AND 711

the Cold Metal Products co.

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PROGRAM

Basic Materials Conference

MAY 17-19 — **SADDLE AND SIRLOIN CLUB**

Monday, May 17, 10 a.m.

MATERIALS OF THE FUTURE

Chairman: T. C. Du Mond, editor, *Materials & Methods.*

Review of New Developments in Engineering Methods — T. C. DuMond.

Rockets and Guided Missiles; How New Materials for Weapons Can Help Industry—Carson E. Hawk, Aerojet-General Corp.

Monday, May 17, 2 p.m.

CORROSION AND EROSION

Chairman: (To be announced)

Corrosion—How To Combat It — Sam Tour, president, Sam Tour & Co. Inc.

Tuesday, May 18, 10 a.m.

NEW METAL FORMING PROCESSES

Chairman: J. H. Jackson, manager, metallurgy, Battelle Memorial Institute.

New Casting Techniques—Lyle M. Christensen, casting design consultant, producibility engineering, Northrop Aircraft Inc.

Powder Metallurgy — Dr. H. H. Hausner, Atomic Energy Division, Sylvania Electric Products Inc.

Forging, Stamping and Extruding —J. Walter Gulliksen, general superintendent, Worcester Pressed Steel Co.

Tuesday, May 18, 2 p. m.

NONMETALLIC MATERIALS

Chairman: Charles D. Leedy, design engineer, test equipment, Bendix Products Division, Bendix Aviation Corp.

Plastics—Dr. Jesse H. Day, editor, *SPE Journal.*

Carbon and Graphite—Fremont F. Ruhl, sales manager, United States Graphite Co.

Ceramics—Dr. John H. Koenig, director, School of Ceramics, Rutgers University.

Glass—W. H. McKnight, supervisor of development engineering, Corning Glass Works.

Rubber—Dr. J. H. Faull Jr., consultant to Office of Naval Research, Naval Department, on elastomer research and development.

Wednesday, May 19, 10 a.m.

JOINING

Chairman: Charles B. Leape, Materials Engineering Department, Westinghouse Electric Corp.

Adhesive Bonding of Metals and Plastics—George Epstein, research engineer, North American Aviation Inc.

Wednesday, May 19, 2 p.m.

MATERIALS MANAGEMENT

Chairman: Stuart S. Kingsbury, chief materials and process development engineer, Piasecki Helicopter Corp., Morton, Pa.

How to Set Up and Operate a Materials Department—Dr. M. A. Williamson, director of research, Burroughs Corp.

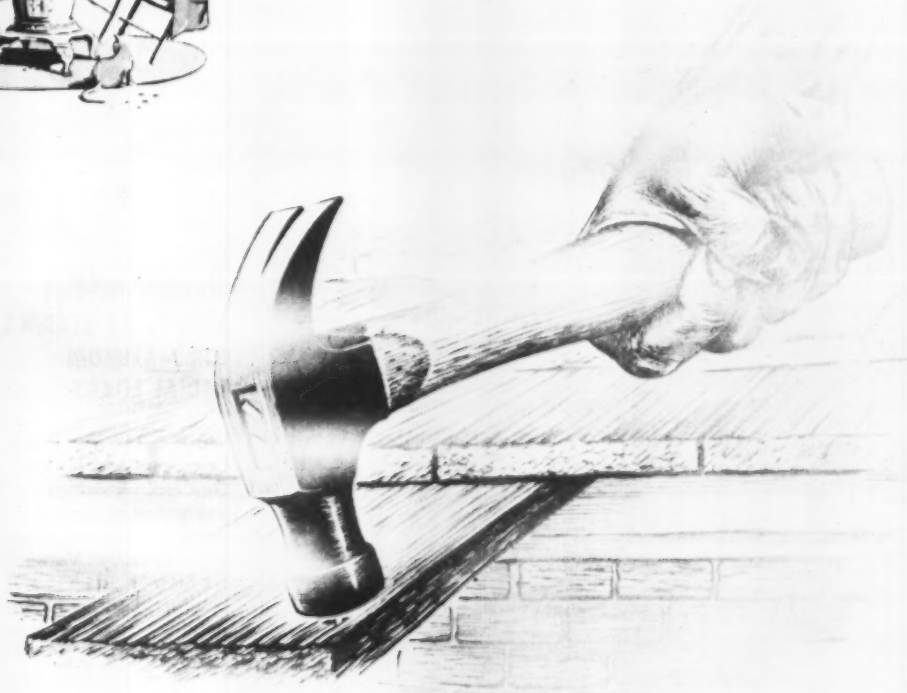
EXHIBITORS

Basic Materials Exposition

MAY 17-20 — **INTERNATIONAL AMPHITHEATRE**

EXHIBITORS	BOOTH NO.
Albany Felt Co., Albany, N. Y.	427
American Lava Corp., Chattanooga, Tenn.	340
Amos Molded Plastics Division, Amos Thomas Corp., Edinburg, Ind.	418
Ampco Metal Inc., Milwaukee	225
AUTOMATION Magazine	220
Balsa Ecuador Lumber Corp., New York	645
Beryllium Corp., Reading, Pa.	210
Bettinger Corp., Waltham, Mass.	312
Brown Co., Boston	345
A. M. Byers Co., Pittsburgh	111
Carboloy Department, General Electric Co., Detroit	324
Carborundum Co., Niagara Falls, N. Y.	325
Cerro de Pasco Corp., New York	318
Cold Metal Products Co., Youngstown	707-711
Corning Glass Works, Corning, N. Y.	216
Dobeckman Co., Cleveland	502
Dow Corning Corp., Midland, Mich.	329
E. I. du Pont de Nemours & Co., Wilmington, Del.	200-211
Ferroxcube Corp. of America, Saugerties, N. Y.	414
Firestone Plastics Co., division of Firestone Tire & Rubber Co., Pottstown, Pa.	128
FOUNDRY Magazine	220
Frenchtown Porcelain Co., Trenton, N. J.	235
Gamble Bros. Inc., Louisville, Ky.	416
General American Transportation Corp., Chicago	328
General Plate Division, Metals & Controls Corp., Attleboro, Mass.	217
Globe Co., Chicago	415
Goodyear Tire & Rubber Co. Inc., Akron	333
Haveg Corp., Newark, Del.	342
Howard Foundry Co., Chicago	228-232
Hunter Douglas Corp., Riverside, Calif.	234
Improved Seamless Wire Co., Providence, R. I.	718
Industrial X-Ray Inc., N. Seattle, Wash.	338
International Balsa Corp., Jersey City, N. J.	407
International Nickel Co. Inc., New York	341
Janney Cylinder Co., Philadelphia	125
M. W. Kellogg Co. New York	320
LaSalle Steel Co., Chicago	240
Lignum-Vitae Products Corp., Jersey City, N. J.	407
MACHINE DESIGN Magazine	220
Malayan Tin Bureau, Washington	131
Materials & Methods Magazine, New York	311
Mica Insulator Co., Schenectady, N. Y.	123
Mycalex Corp. of America, Clifton, N. J.	117
National Lead Co., New York	132, 134, 140
National Vulcanized Fibre Co., Wilmington, Del.	241
NEW EQUIPMENT DIGEST	220
Pacific Transducer Corp., Los Angeles	435
Penton Publishing Co., Cleveland	220
Polymer Corp. of Pennsylvania, Reading, Pa.	408
Powdered Metal Products Division, Yale & Towne Mfg. Co., Franklin Park, Ill.	133
Product Engineering Magazine, New York	121
Reynolds Metals Co., Louisville, Ky.	110
Ridgidized Metals Corp., Buffalo, N. Y.	135
Rohm & Haas Co., Philadelphia	233
Rolled Plate Division, American Silver Co. Inc., Flushing, N. Y.	229
South Florida Test Service, Miami, Fla.	722
Sperry Products Inc., Danbury, Conn.	412
Star Porcelain Co., Trenton, N. J.	235
STEEL Magazine, Cleveland	220
Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.	325
Superior Steel Corp., Carnegie, Pa.	330
Superior Tube Co., Norristown, Pa.	425
Sylvania Electric Products Inc., New York	120
Synthane Corp., Oaks, Pa.	501
Taylor Fibre Co., La Vergne, Calif.	141
Time Magazine, New York	302
Toyad Corp., Latrobe, Pa.	429
United States Testing Co. Inc., Hoboken, N. J.	334
Western Felt Works, Chicago	215
Westinghouse Electric Corp., Pittsburgh	406
Wisconsin Centrifugal Foundry Inc., Racine, Wis.	724
Wolverine Tube Division, Calumet & Hecla Inc., Detroit	602

THE BURLINGTON LIARS' CLUB
SPINS A YARN FOR **BAKER'S MAGDOLITE**



Nailed Right to the Fog!

One day down in Indiana, a heavy fog came up while a crew of carpenters were shingling a roof. The fog got so thick that one by one the workmen quit and felt their way down the ladder to the ground—all except one. Sam was what you'd call mule-stubborn and he decided he would shingle his course to the edge of the roof before he quit. It seemed to take Sam quite a while to finish the job. When he investigated, he discovered he had laid 10 feet of shingles out onto the fog.

Are you in a fog about which dolomite to use? Specify BAKER'S MAGDOLITE the next time you order. It is always 5 ways better: Composition, Preparation, Strength, Economy, Quality. BAKER'S MAGDOLITE, the original dead-burned dolomite, helps you to increase your quantity of uniform ingots, with less defective production material, and at lower fuel costs. BAKER'S MAGDOLITE has chemical, physical and mineralogical qualities that assure you of a better job . . . every time.

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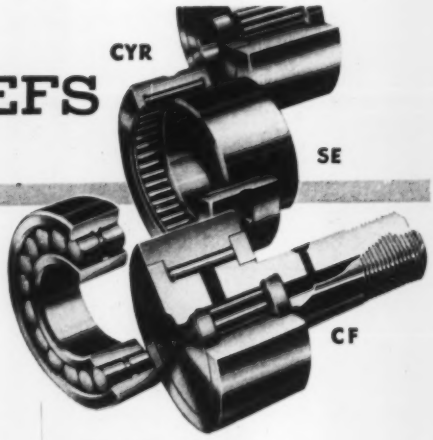
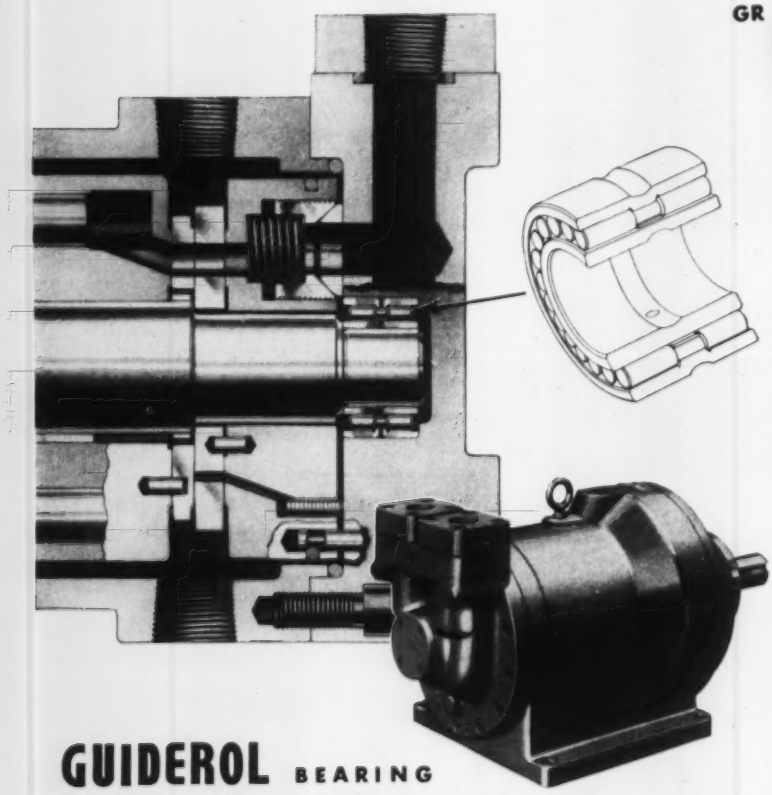
(Advertisement)

McGILL BEARING BRIEFS





GUIDEROL BEARING

used in pilot model Oilgear Motor

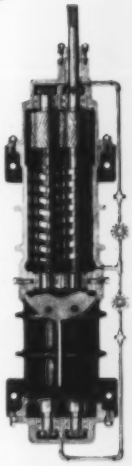
SHOWS NO WEAR AFTER 4000 HOUR TEST

The Oilgear Company, Milwaukee, Wisconsin, a regular McGill bearing user, has been testing a pilot model of a new 60 HP Axial Type Hydraulic Motor equipped with Guiderol Bearings for over a year. After 4000 hours of full load operation, the Guiderol Bearing used on the pilot end of the motor shaft was removed and inspected. It was still in perfect condition showing no internal wear.

This new line of lighter and faster operating axial piston units take advantage of the Guiderol bearing's assured freedom from skewing and extra load capacity in reduced radial bearing space.

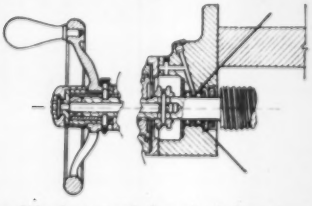
Mr. Ernst Wiedmann, Oilgear Chief Engineer, is enthusiastic about the performance of the Guiderol Bearings. He says: "They are the best full-type roller bearings for our hydraulic pumps and motors." As a result he is changing old specifications for this type of bearing to Guiderol and including Guiderol Bearings on all new developments.

WARREN-QUIMBY ADOPTS GR BEARINGS FOR MAXIMUM RADIAL LOADS



Warren Steam Pump Company has adopted Guiderol Bearings at five points of maximum radial load in this Warren - Quimby Vertical Screw Pump. The Guiderol Bearings have more load carrying capacity in the limited space available and enable vertical mounting of the pump without roller skewing or locking.

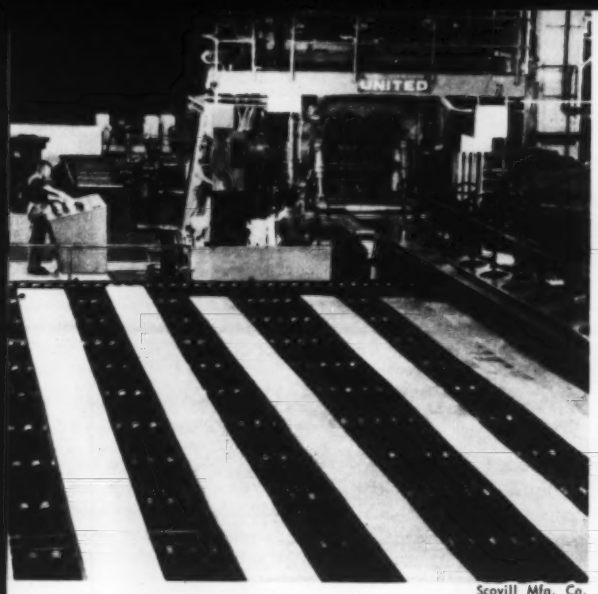
KEARNEY & TRECKER FINDS LIFE FACTOR INCREASED IN TABLE FEED APPLICATION



The life factor of the shaft bearing on the table feed screw of Kearney & Trecker Milling Machines has been increased by the simple process of changing to Guiderol Bearings. These bearings increased capacity, performance and bearing life.

BEARING SELECTION GUIDE
A new 140-page Bearing Selection Guide, complete with 30 pages of vital engineering data, has been released by the McGill Manufacturing Co. Ask for Catalog No. 52.

McGILL® — Precision Bearings
McGILL MANUFACTURING COMPANY, INC.
301 N. Lafayette Street, Valparaiso, Indiana



Scovill Mfg. Co.

COPPER-BASE ALLOYS

Toughness and Hardness Have Been Added

Fabricators get a wider range of strengths and easier fabrication that utilizes more techniques—these plus high machinability and corrosion resistance

ENGINEERING ALLOYS of precise composition and predictable properties are widening application opportunities for the versatile copper base alloys.

Metallurgists are building in new values to their mixtures by controlled additions of aluminum, antimony, arsenic, beryllium, chromium, iron, manganese, lead, phosphorus, silicon, silver and tellurium, besides the common alloying elements zinc, tin and nickel.

Fabricators are offered these properties: A wide range of strength, roughness and other physicals; ease of fabrication by many different methods; generally good machineability; high corrosion resistance; a wide choice of finishes; high value of scrap from machining operations and in many alloys, copper's excellent thermal and electrical conductivity is maintained.

Government Push—Defense applications have opened the door to commercial use for several alloys. An example is aluminum bronze, containing 7 per cent aluminum and 2 per cent iron. Though it's been around for some time, the Navy minesweeper program gave it a push because it is strong, corrosion resistant and nonmagnetic. Government specifications require a 70,000 psi minimum tensile strength even in annealed condition, which for copper alloys is quite high. Supplied in sheet, plate and rod forms, the material can be hot worked easily and cold formed reasonably well. Though there have been difficulties in casting and mill processing, the alloy is regarded as finally coming into its own, especially for handling mild acid solutions and other chemicals.

Cupro-nickel, containing 10 per cent nickel and 1.3 per cent iron, is gradually taking over as a partial substitute for the 30 per cent nickel alloy for condensers, evaporators, heat exchangers and salt water piping in view of the chronic nickel shortage. Light drawn tube has tensile strength of 60,000 psi, yield strength of 57,000 psi and good capacity for being cold formed and bent.

More Combinations—Also gaining in popularity is free-cutting phosphor bronze containing 4 per cent each of lead, zinc and tin. It's used for such industrial products as bearings, bushings, gears, valve parts, pinions and shafts. In half-hard rod form, it has tensile strength of 75,000 psi; elongation is 15 per cent in 2 inches.

Where a good combination of conductivity, machinability and strength are needed, tellurium copper has proved a valuable alloy. Having conductivity 50 per cent that of pure copper, parts of the material (nickel and phosphorus additions aid in providing hardening capacity) can be produced automatically and with fine finish. It's available in round and hex rod forms in hard drawn or spring temper.

Attention to Fabricating—Processes for fabricating copper alloys are receiving a lot of attention. Hot extrusion of copper alloys using glass as a lubricant is under active development. Extrusion presses now being installed will produce rods and larger sizes of tubes, and improve quality and range of many high strength engineering alloys.

Techniques for producing longer nonwelded brass coils mean longer runs in fabricators' machines. Clean, smooth surfaces, minimum dimensional variations, uniform temper soundness and ductility promote tool life, increase working limits and allow extra deep draws and sharp bends.

Fine grain bright finish brasses are gaining in popularity; they allow use of lighter gages, thus cut-

Progress is built

Fairbanks-Morse will also continue to supply electric motors in *old* NEMA *frame* sizes.

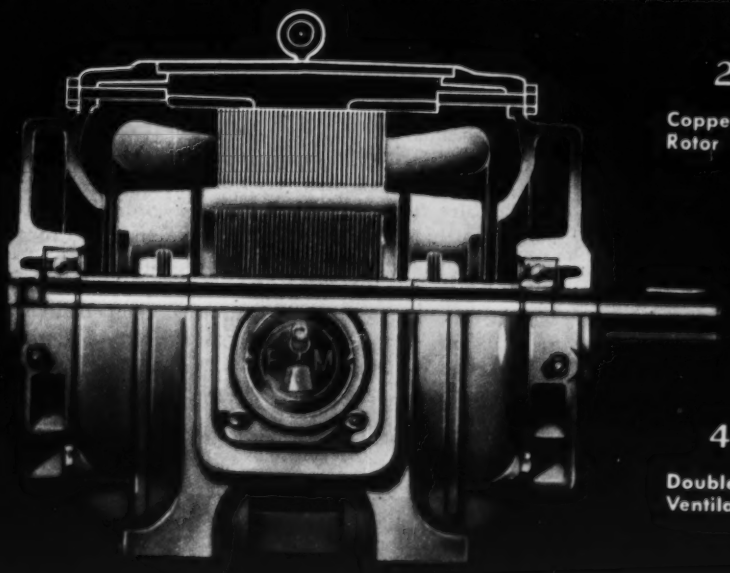
. . . brick by brick

The new NEMA Standard for electric motors is a significant sign of progress to all industry—More Power in Less Space.

But progress—to be lasting—must be built brick by brick For more than a century, Fairbanks-Morse designers have held to the ideal of more performance in less space. They have produced outstanding advancements in the design of diesel engines, pumps, scales, locomotives and the many other products that feature F-M exclusives. Fairbanks-Morse electric motors built on this basic F-M engineering philosophy are continuing assurance of operating economy and efficiency.

Look for the electric motor that stands on this Fairbanks-Morse solid foundation of design progress. It carries the Fairbanks-Morse Seal of Quality.

NEW FAIRBANKS-MORSE GUARDED DRIPPROOF MOTORS



1 Guarded, dripproof construction keeps falling objects and dripping liquids out of motor in any mounting position—maximum motor protection under conditions of wet or dirty operation—indoors or out.

2 Exclusive Fairbanks-Morse feature that provides a virtually indestructible one-piece rotor—homogeneous, free from flaws and gas inclusion for maximum strength and lifetime service.

3 Oversized, precision ball bearings in spacious housings, sealed against grease leakage. Contain ample lubrication for extended periods of rugged service. Convenient flushing and re-lubricating available if desired.

4 F-M exclusive design eliminates hot spots. Cooling outside air is drawn into motor through openings in lower portion of both bearing arms and circulated through cored passages in the frame.

5 New, gasketed, cast iron conduit box permits easy pulling of cables without insulation damage. Fairbanks-Morse exclusive: recess feature allows elimination of conduit box where space is limited.

FAIRBANKS-MORSE

a name worth remembering when you want the best

ELECTRIC MOTORS AND GENERATORS • DIESEL LOCOMOTIVES AND ENGINES • PUMPS • SCALES • RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

Copper & Brass Research Association

General Metal Products Co.

ting both weight and metal costs. Already taking on many applications, the technique is spreading to higher copper alloys such as red brass and gilding in addition to 70-30 brass. The metal is harder, stronger and springier than normal drawing brasses due to a very heavy reduction before the final anneal, and annealing is at a much lower temperature than is normal. Grain sizes as low as 0.005 mm are now being supplied; the smaller the grain size, the higher the tensile strength and the greater the hardness.

Tooling and Handling—Fabricators find that tooling and handling practices often must be modified to utilize the material; even producers warn against indiscriminate use of these ultra fine grain alloys. Because they're stiff and springy, modification of punch and die set-up practices is often called for, as is increased pressure on holddowns and cushions. If care is exercised to protect the good mill finish, polishing operations can be minimized.

The material is supplied in strip and sheet for press room products and in wire form for cold heading and upsetting purposes.

Powder Metallurgy—Brass was a late starter in the field of powder metallurgy but is coming on fast. Some 30 companies presently fabricate brass powder structural parts. Uniform shrinkage of brass during sintering permits accurate die design that results in high-density product with low forming pressure required. Tensile strengths obtained are exceeded only by the iron-copper alloys under comparable production conditions, and brass has good elongation properties and solid density.

Applications for fabricated parts until recently centered largely on ordnance and other military components; today powder is expanding into a wide range of gears, cams and other structural product components.

Popularity for Beryllium—With ending of controls, beryllium-copper alloys are gaining popularity because of their combination of high strength and electrical conductivity. Addition of small amount of beryllium produces an age-hardening alloy that can be worked while in the soft condition, and by low-temperature heat treatment given high hardness and tensile strength. Standard beryllium copper with 2 per cent beryllium, 0.3 per cent cobalt and balance copper, can be heat treated to a tensile strength of 200,000 psi.

Good fatigue resistance, corrosion and wear resistance, ease of forming and nonmagnetic properties make it widely used for electrical contacts, springs, resistance welding electrodes, bellows, terminals, safety tools and similar products.

Beryllium can also be cast by sand, plaster, investment and pressure methods.

Chase Brass & Copper Co.

Sure, Westinghouse drives helped us lick a couple of quality problems

The following pages show how Westinghouse matched apparatus and engineering assistance did it

MOTORS cut rejects on a stamping operation
CONTROLS made our job more automatic
GEARMOTORS eliminated service headaches

Coordinated Westinghouse equipment cut our stamping rejects

Working to the customer's own requirements, Westinghouse engineers link electrical equipment with new ideas in metal fabricating. Here is an improved manufacturing process and the coordinated Westinghouse apparatus that makes it go.

Coating machine (pictured at right) covers sheets with a special compound to prevent the sheet's sticking during stamping and forming operations. It's quickly brushed, cleaned, sprayed and dried. The percentage of stamping rejects drops off because the sheet can slide in the stamping machine without tearing. There's less chance of scoring the die, too. Westinghouse provides all the equipment to power machines like this.

New Life-Line® "A" motors are designed with the user's toughest application problems in mind. In addition to its compactness, the new motor has a fortified insulation system, with high thermal stability and resistance to moisture, oils and chemicals. On-the-job greasing isn't required, thanks to the "A" motor's 4-way seal and pre-lubricated bearings. Armorized cast-iron frame provides a housing that stands up to corrosion and physical abuse. Straight-through ventilation makes the Life-Line dripproof regardless of its mounting position.

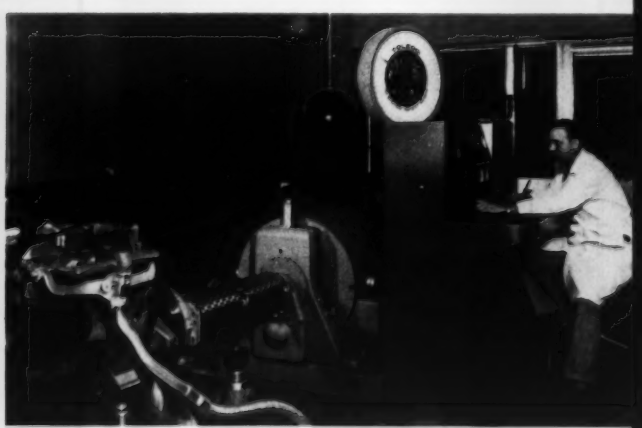
Control panel (bottom of page) features Westinghouse components, carefully coordinated in another automatic cleaning process. Seven Life-Line Starters protect the motor against overloads. A Westinghouse F frame circuit breaker, located in the upper left corner, protects both the motor and control against short circuits. There's a safety interlocked handle mechanism on the enclosure cover. In sharp contrast to starters of conventional armature design, Life-Line Starters seldom require attention. The exclusive Westinghouse knife-edge bearing design drastically reduces friction and wear.

Westinghouse gearmotors have the motor mounted directly on the gear case. This integral design rids you of time-consuming coupling alignment or repair. Exclusive horizontal split case provides a simple, speedy maintenance advantage. Remove a few bolts, lift the gear cover, and all gearing parts are free for removal or inspection. You don't need to drain or disturb the unit's mounting or coupling to the driven load.

YOU CAN BE **SURE**...IF IT'S

Westinghouse

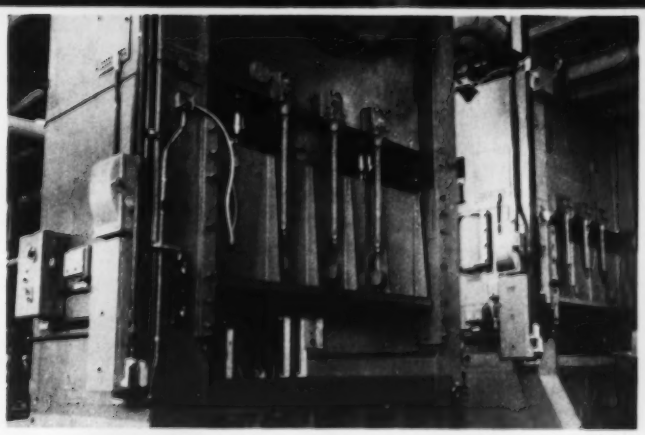
Control panel, outside a dust-tight room, operates shot blasting against forgings to knock off flashings and scale. Westinghouse control handles the sequence from start to stop. When it finishes, it's ready to go again—automatically.



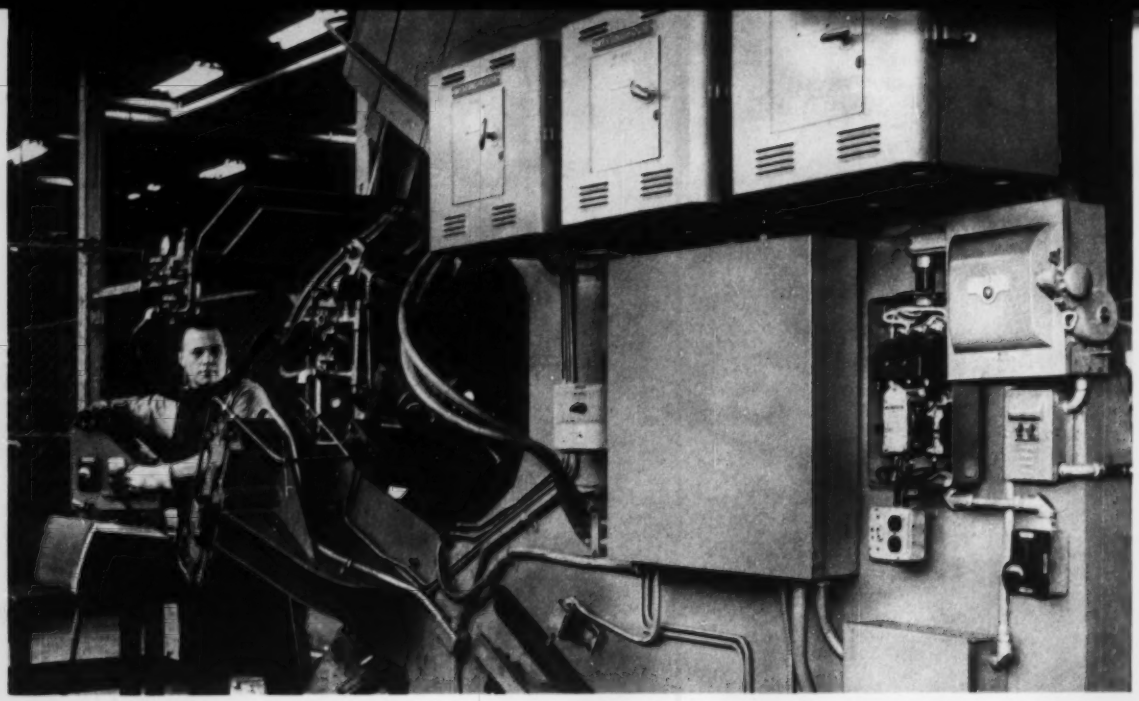
Dynamometers measure output or input torque and horsepower. Westinghouse makes them—rugged but sensitively accurate—with rolled steel stator frames, dynamically balanced armatures, and hydrodynamic trunnion bearings.

Teamwork among Westinghouse 3-hp Life-Line gearmotors (11 of 'em) and starters helps this coating machine prepare sheets for stamping. Westinghouse engineers planned the installation to meet the customer's ideas and requirements.

New Life-Line "A" motor has frame, feet and end brackets of heavy cast iron. Other new Westinghouse features: Bondar insulated wire; Bondite impregnating varnish; unitized stator; balanced, die-cast rotor.



Westinghouse press control improves the output on this stamping press—next job after the coating machine. Westinghouse controls handle each step progressively, automatically, after the operator punches the start button. Safety switch is located at upper right.



Westinghouse Weld-o-trols improved our welding operation

Westinghouse resistance welding electronic controls are used for precisely timed welding. They handle thousands of amperes. Resistance welders, like the one above, make vacuum-tight welds on every operation. They maintain the correct weld time period day after day, making millions of spot welds without the need for readjustment or mechanical maintenance.

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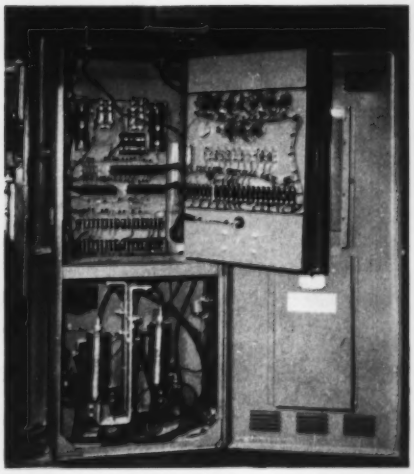
MP 3011



Electronic resistance welding controls are protected by a 600-volt ABI circuit breaker and control the complex welding operation. The operator works the start-stop buttons. There's a safety switch below the control box.

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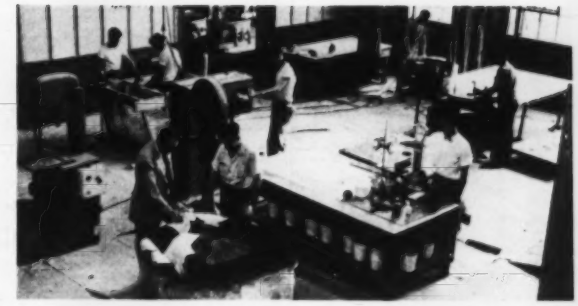


Work on plastic dies at Chrysler is carried on in this so-called die kitchen in one of the firm's Detroit plants

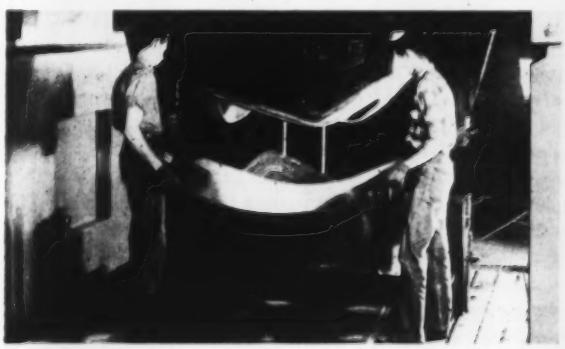
PLASTIC TOOLING KITCHEN

BETTER RECIPES FOR PLASTIC DIES

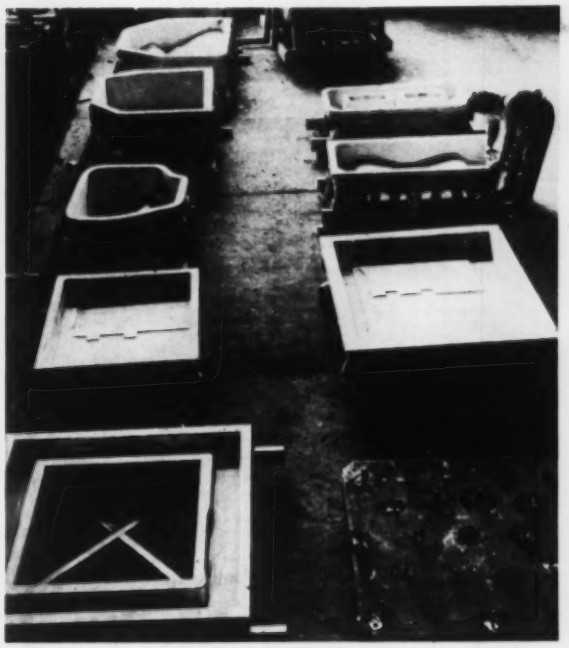
PLASTIC TOOLING techniques improve almost week by week as designers, realizing the potential, concentrate on this short-run economizer. Some of the most advanced work in the field comes from the automakers, who are among those standing to gain the most from expanded application.

Chrysler Corp., which devotes considerable space, time and effort to development work in this field, reports plastic dies can now be made in three to four weeks. This is compared with the three to eight months required for delivery on the conventional steel counterpart. Even the experimental plastic dies now are being made 30 per cent cheaper than steel units; and when they are used on a large scale, the saving may run as high as 70 per cent, according to C. F. Vandekerck, Chrysler's staff master mechanic.

Steel generally outlasts plastic in dies, but the cost difference makes application of plastic types advantageous on many short run jobs. Another advantage: If plastic chips, it can be repaired.



Finished product in action: Blanks are fed into a 600-ton Clearing press in which the plastic dies are mounted

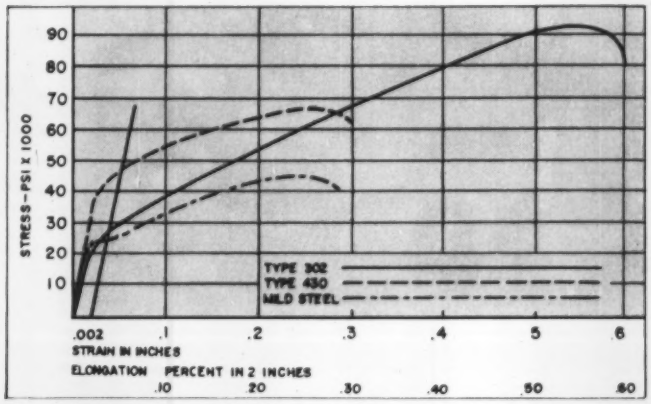


Various shapes of plastic casts used for die molds are lined up outside the die shop. Weldment in foreground will be attached to die so it can be fitted into press

Plastic die in its mold is removed from oven. Baking takes place after plastic is mixed with catalyst and attached to weldment. Glass cloth in various weaves and textures placed beneath die's striking surface adds strength

After removal of mold, workman puts finishing touches on die by giving it a thorough going-over with sandpaper

TYPICAL STRESS-STRAIN CURVES
TO RUPTURE
ROOM TEMPERATURE



DRAWING STAINLESS

How To Make It Fit Your Product

Careful attention to properties can make stainless a significant factor in product design. Here's an outline for profitable production of shapes

MANY fabricators specifying stainless as they redesign to meet competition are faced with large-scale production of stainless shapes for the first time. And when the question of drawing comes up, they show a tendency to put drawing at the bottom of the list headed "desirable."

But their fears are unfounded. Generally, drawability of all chromium-nickel grades is excellent. Draws of 40 to 50 per cent reduction are common; those of 50 per cent are obtained frequently. Type 302 and 304 are those most widely used for deep drawing, with 301 used for more shallow draws because of its high work-hardening rate. Type 305 gets the nod where low work hardening rate is desired.

Forming the straight chromium grades usually is limited to types 410, 403, 405 and 430. Except for higher power requirements, performance generally is similar to carbon steels.

Behavior by Grade—There are over 30 different standard stainless steels, usually classified in three groups: Chromium-nickel types, of which those with a nominal 18 per cent chromium and 8 per cent nickel are the best-known; a group with a nominal chromium content of 17 per cent, little or no nickel, and relatively little carbon; and the group with a nominal chromium content of 12 per cent, little or no nickel and usually enough carbon to make them hardenable by heat treatment.

Highest corrosion resistance is displayed by the chromium-nickel types. These are almost mandatory in food or chemical processing, or where sanitation or purity problems arise, and are preferred for many other applications. Fortunately, these chromium-nickel stainless steels, which have the greatest usefulness of all stainless steels, also have the highest formability. Their ductility is almost twice as great as the average deep-drawing, plain-carbon steel, despite higher strength and hardness. However, they work-harden, and this factor must be taken into consideration in die design and press operation.

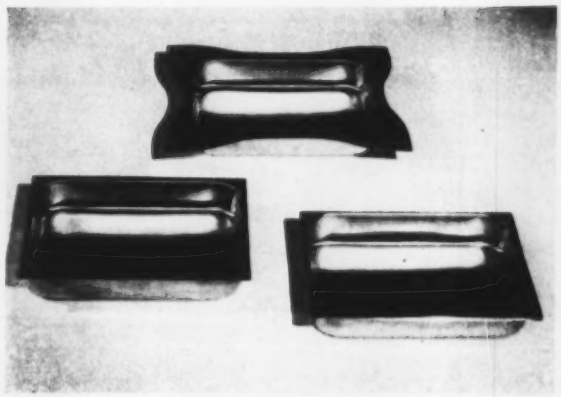
Taking Out Nickel—Many parts formerly specified in a chromium-nickel stainless steel are now made of grades containing only chromium—because of the nickel shortage and lower cost. Sometimes drawing of a 17-per cent chromium type is done with almost identical part designs, and tooling and procedures similar to those used for 18-8, but generally the difference in drawing characteristics must be allowed for.

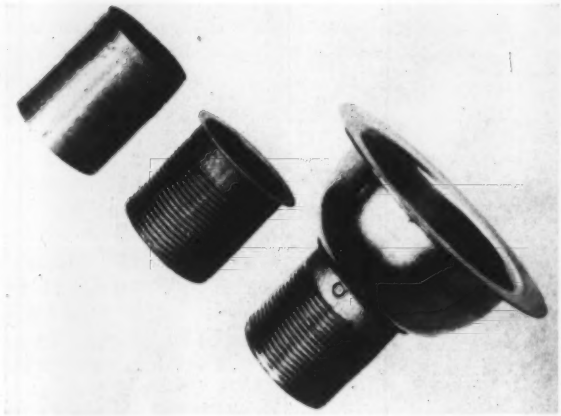
The 17-per cent chromium stainless steels are much like ordinary plain carbon steel in physical properties and drawing characteristics. Tensile strength and ductility is much lower than that of the chromium-nickel types. Type 430, a typical 17-per cent stainless steel, can be stretched less than half as much as type 302, a typical 18-8. On the other hand, it does not work-harden.

Surface Finish—Stainless steel sheets are furnished in a number of standard finishes, and while the surface condition is of little significance in many simple forming operations, it may play an important part in deep drawing.

A relatively rough surface, such as a No. 1 (hot rolled, annealed and pickled) or No. 2D (cold rolled,

This stainless steel steam table pan is produced by La-Lance & Grosgean Mfg. Co., Woodhaven, N. Y. Its proportions suit it for manufacture either in type 430 or 302 stainless. Stock thickness is 0.046 inch. Inside dimensions are 9¼ x 10¾ inches, with depth at 2-5/16 inch. Punch area is about 50 per cent of blank area. Bottom radius is ½ inch, more than 11t. Die radius is only about 4t, somewhat lower than usually is recommended. After trimming, flange is rolled over in a continuation of this radius as shown at bottom right. Corner radii are an ample 40t.





This household sink strainer is made by Schiable Co., Cincinnati, of type 430 stainless. Before controls, the assembly had been made from type 302 . Schiable first formed the type 430 in the same manner as had been used with type 302, but ran into trouble due to cracking on the inside of the tail piece. The problem was solved by warming prior to forming, reducing flange width, changing die size design slightly and using as much care as possible in cutting and deburring.

Tail piece itself is about 2 inches long. Flange is press-formed in two steps: Flare to about 45 degrees, then form full 90-degree flange. The thread is rolled. Tail piece is fastened to bowl by spot welding inside the tube, with fiber or rubber gasket between flange and bowl.

annealed and pickled) finish, is desirable. Such a finish retains the lubricant better than a smoother finish, No. 2B for example. In addition, because of its higher coefficient of friction, it affords a better controlled and more positive restraining action on the part of the hold-down. Metal with too smooth a surface tends either to slip if the hold-down force is low or seize if the hold-down force is high.

Determining Factors — Choice between No. 1 and No. 2D finish is usually based on the processing, which is to be done after drawing. If there is to be intermediate or final annealing, No. 1 finish is usually used. If, on the other hand, the piece is to be drawn without intermediate or final annealing, and polished after forming, a 2D finish is preferred because it lends itself to more economical polishing.

For less severe drawing operations, on parts to be polished without annealing, a No. 2B finish (cold rolled, annealed, pickled and rerolled) may prove most economical because this finish is an exceptionally good base for subsequent polishing operations. Rerolling, even though it is only a brightening pass, may make it less suitable than the No. 2D finish for severe drawing.

More Press Power — Because stainless steels are stronger than plain carbon steel, more power may be required for drawing—roughly 40 to 50 per cent more, if gage is the same. This does not necessarily mean that a product change from plain carbon steel to stainless steel automatically will mean a need for bigger presses, because the greater strength of stainless usually means a lighter gage can be used for a given part.

Greater hold-down pressure is required for stainless steel to avoid puckering or wrinkling of the blank. Wrinkles and puckers once formed are difficult to remove. For some jobs spring-loaded pressure pads can be used, but generally double-acting presses are preferred. Stainless steels are usually drawn at lower press speeds than plain carbon steel—20 to 25 fpm on the average.

Possible Reductions — Depth to which a metal can be drawn in a single operation under reasonably controlled conditions is often expressed as a percentage of blank size. If punch diameter is d, and original blank diameter D, per cent reduction is $R = 100(D - d/D)$.

Annealed Type 302, the basic 18-8 stainless steel, can usually be reduced 40 to 50 per cent in one draw. Type 305, having a higher nickel-chromium ratio and therefore more stable austenite, is drawn 72 per cent in one operation in commercial practice. Type 430, the basic 17-per cent stainless steel, can be reduced 25 to 30 per cent in one draw. The 12 per cent and 17 per cent stainless steels are more ductile and draw better if preheated to 200 to 300° F. Preheating blanks and dies to 150 to 300° F reduces the tendency of the chromium-nickel types to work harden.

Relating Depth to Punch—In the case of simple box and cup shapes, depth of draw can be expressed by relating depth to punch diameter. For a single draw with 18-8's, depth should usually not be more than 75 per cent of punch diameter. In 17 per cent chromium

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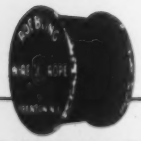

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stainless steel, depth is usually limited to 26 per cent of punch diameter to assure production in a single draw.

If the drawn cup or box will have approximately the same total area as the blank from which it was drawn, the depth-to-punch diameter ratio of 75 per cent for 18-8's implies that punch cross-sectional area must be at least 25 per cent of total blank area. This rule enables a designer to apply the general rule for conservative depth to pieces with flanges as well as simple cups.

When a box shape is to be drawn, this relationship between punch area (area of the box bottom) and total blank area is useful. If a box has a ratio of length to width between one and nine, the punch area may go somewhat smaller than if the box is square or long. At a length-to-width ratio of about three, a punch area 22 per cent of blank area is practical when drawing 18-8. Above and below three, punch area should be increased toward 25 per cent.

Avoid Sharp Corners — Small radii or sharp corners mean extra work on the metal being drawn—and extra tool wear and the possibility of cracking the workpiece. Minimum radii are usually expressed in multiples of metal thickness (t).

If the bottom of the part to be drawn is not flat, punch or bottom radius of the part should be at least 4t if 18-8 is being used. For 17-per cent chromium types, 5 to 8t is the recommended minimum. Radius of the edge of the female die should be between 5 and 8t, where possible, for 18-8 steels; between 7 and 15t for the 17-per cent chromium types. If this radius is too small, the metal may tear during drawing. If it is too great, wrinkling problems increase.

Corner radii of boxes should be as large as other design considerations will permit. Minimum is about 5t with 18-8's and 8 to 10t for 17 per cent chromium types.

Avoid Ironing—When clearance between punch and die is less than blank thickness, ironing—working metal between punch and die surfaces—occurs. In this case, reference is to original blank thickness and progressively-increasing thickness of the part of the blank not yet in the die—caused by shrinking of each segment of metal as it is pulled over the draw radius. Forces that would be required to thin down sidewalls between punch and die are great for the chromium - nickel stainless steels because of their high initial strength and particularly because of increased hardness developed during the drawing operation. To avoid these problems, clearance for chromium-nickel types should be about twice what would be allowed for plain carbon and for 17-per cent chromium stainless steels.

If it is anticipated that problems introduced by the work-hardening characteristics of the typical 18-8's will be severe, a variation of the basic 18-8 type can be used. This is the type 305 mentioned previously, in which the ratio of nickel to chromium is increased, promoting austenitic stability and reducing work-hardening.

Other Die Design Tips—Springback allowance for chromium-nickel stainless steels should be two to three times that for plain carbon steel.

For short runs, hardened alloy cast iron dies are often used; its slightly porous nature retains lubricant well. For high production runs, dies of nondeforming tool steel, high-carbon high-chromium or even high speed tool steels are preferred. If ironing must occur, cemented-carbide female dies or inserts stand up best. Carbides are also used where deep draws involving excessive sliding, as in deep cups, are made at moderate or high pressures. Medium-hard aluminum bronze dies are also frequently used where there will be considerable sliding.

The high pressures involved in blank hold-down, as well as drawing proper, make it desirable to have the best possible finish on dies to minimize the possibility of galling. Carefully-polished dies will pay off in longer life and reduced drawing difficulties.

Lubricant Selections — Extreme pressure oils and pigmented drawing compounds are usually preferred for drawing stainless steel. The extreme pressure oils are usually sulphurized or chlorinated fatty oils or paraffin waxes, concentrated or diluted with mineral oil. Emulsion-type pigmented compounds are composed of fats or fatty oils, or sometimes mineral oil, with pigment such as lithopone, soap and water. They often are applied to the blank and allowed to dry before drawing. Pigmented oil compounds, often sulphurized, also are used with stainless steel.

It is important to clean off lubricant following a drawing operation, prior to annealing. If this is not done, pitting and reduction of corrosion resistance can occur. Although in some unusual cases the oxidized surface resulting from annealing aids retention of lubricant and is desirable, in most cases pickling is recommended.

COMPARISON OF TYPICAL PHYSICAL PROPERTIES

	(annealed condition) Typical 18-8 (Type 302)	Typical 17 pct. (Type 430)	Typical 12 pct. (Type 410)	Typical Deep Drawing Plain Carbon Steel
Yield	30,000	35,000	35,000	30,000
Tensile	75,000	70,000	65,000	45-55,000
Elongation (in 2 in.)	50-60%	20-35%	25-30%	30-35%
Olsen Cup Test	0.400-0.500	0.300-0.400	0.300-0.400	0.375-0.400
Rockwell B Hardness	75-85	80-85	75-85	45-55

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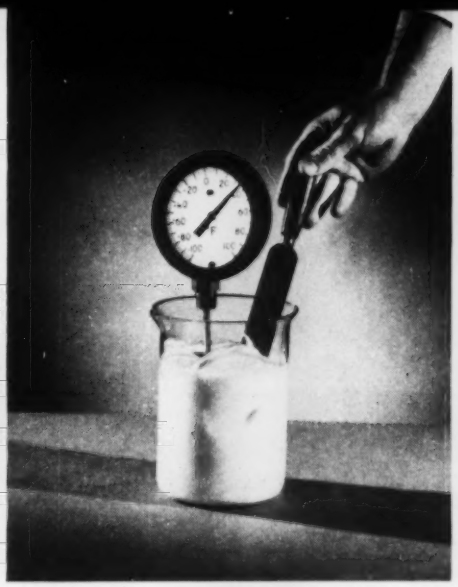

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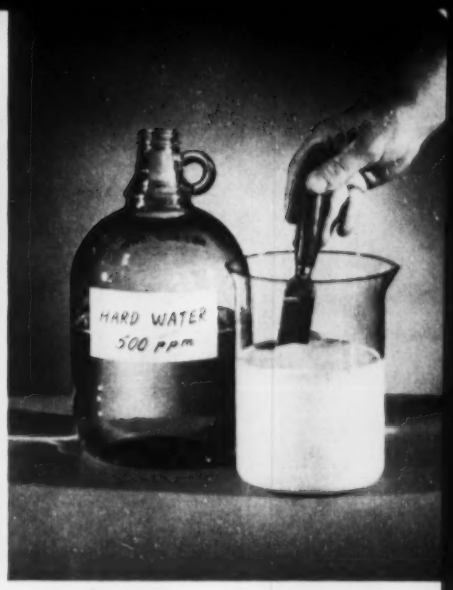

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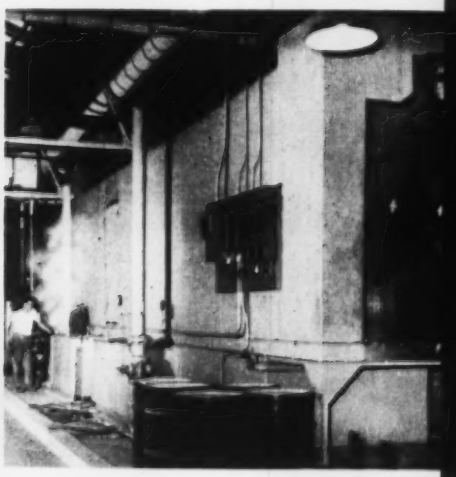

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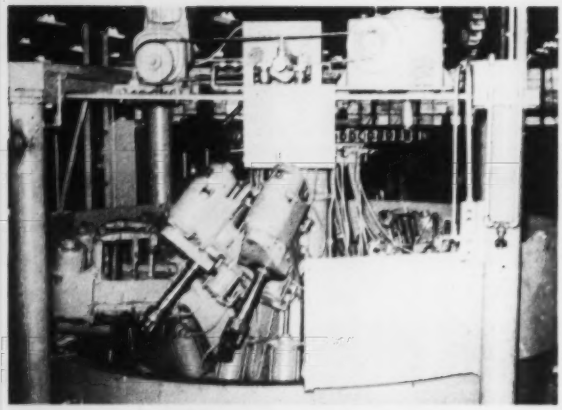
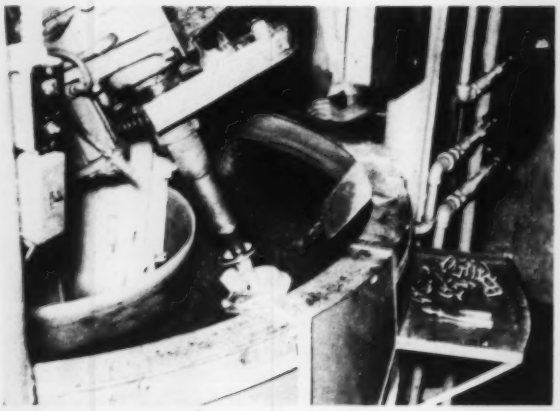


Twelve-spindle deburring machine rotates parts through moving slurry. Two spindles in the foreground are raised for loading and unloading. Cycle is automatic



Workpiece on spindle above has just been loaded and is entering the wet abrasive slurry. When cycle is completed, part is water-flushed to remove the slurry

SLURRY DEBURRING . . .

Machine Adds Finishing Touches

Rotating the workpiece in a moving abrasive slurry, this machine deburrs, rounds corners or improves surface finish. It's mechanization of a bench operation

SMOOTH PRODUCTION FLOW of parts in process often bogs down at a bench operation. Usually both time and product uniformity are lost.

Engineers at Thompson Products Inc., Cleveland, mechanized some of their product finishing with a resultant saving of 60 per cent in man hours alone. Essentially a deburring operation, the process used at Thompson shows several other facets.

Versatile—Paul Hayes, industrial engineer in the Accessories Division, says their work proved: "It was not only possible to deburr and polish simultaneously, but a considerable reduction in microinch surface finish could be consistently obtained. It then became apparent that micropolishing could also be done on a high production basis. On other applications, bench hand work, hydro blasting and even buffing have been eliminated."

Parts which have been processed include complex body castings, gears, pressure wheels, etc., including materials such as bronze, aluminum, cast iron and stainless steel. All show good cost reductions.

What It Is—The finishing process is called Mechamatic. Equipment is built by the Mecha Finish Corp., Sturgis, Mich. Method employs the principle of a controlled, high-speed directional flow of small abrasive in a wet slurry. Slurry is contained in a tank, and there is no recovery problem.

Machines are made with from 4 to 14 spindles that index through 360 degrees. As each spindle approaches the unloading position, it automatically rises; part and spindle are water-flushed to remove slurry.

Spindles rotate parts, held in chucks, at about 8 rpm in the slurry. As the rotating spindles index in one direction, the slurry in the tank flows in the opposite. Relative flow of slurry to workpiece would amount to about 400 feet per minute.

What It'll Do—Production experience has shown that the unit can consistently and uniformly radius or break edges and corners to as little as 0.001-inch. On the other hand larger radii can be produced.

Also, low microinch surfaces can be produced. Surfaces can be regarded as nondirectional — there are no visual polish lines.

Control—Variables of the process are: Nature of the slurry, speeds of spindle rotation, index and slurry travel, and position of part in the slurry. Deflection plates also can be used to influence action of the slurry on the workpiece.

Proper co-ordination of these variables will determine which surfaces are worked, and the extent to which the work is done.

SPECIALIZED METAL WORKING Calls for H-P-Ms

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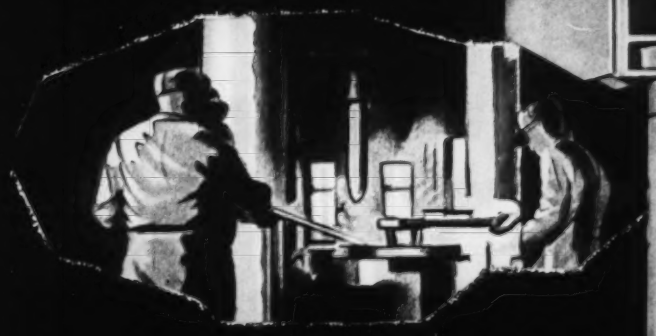

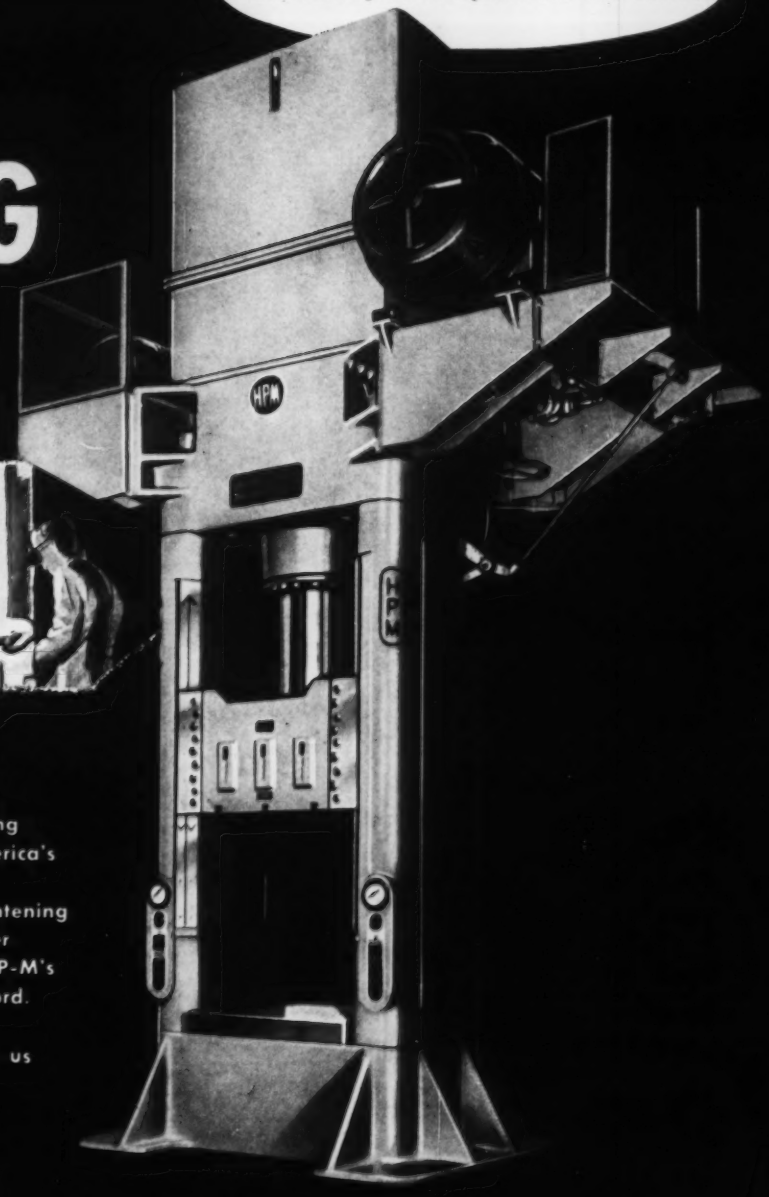

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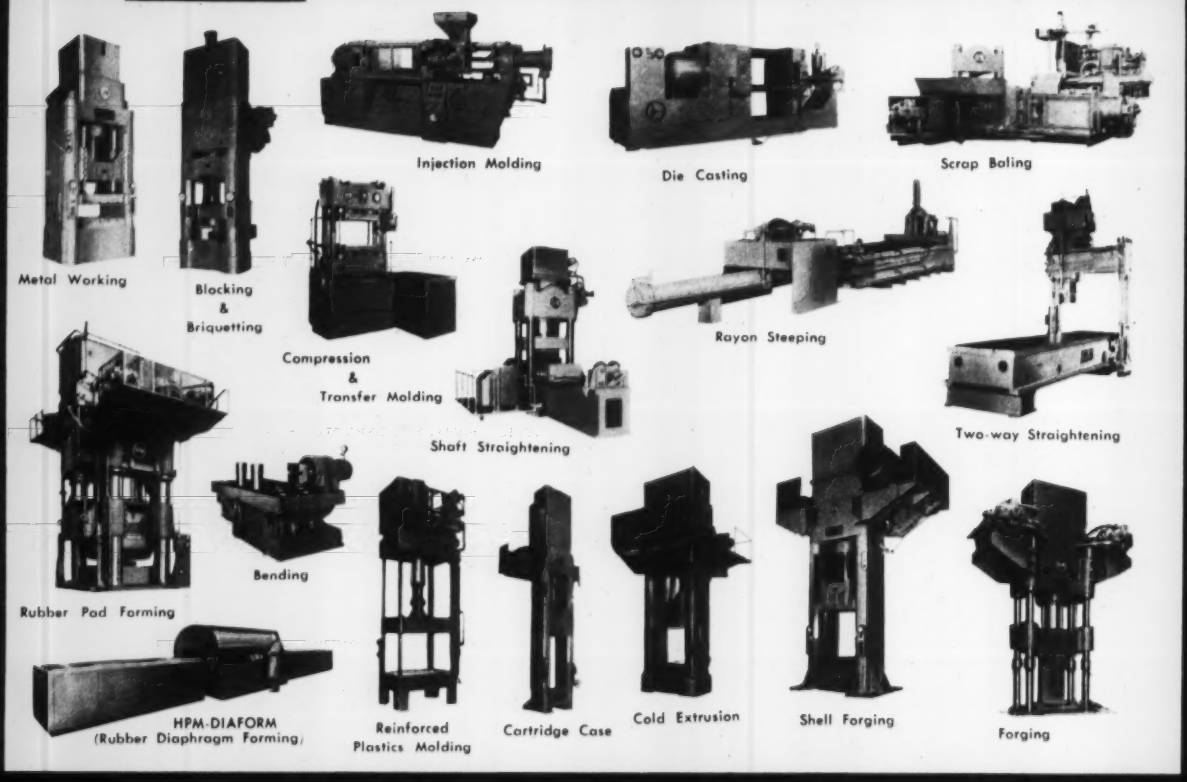

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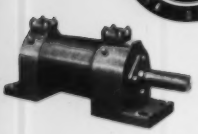

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Split Die Extrusion

ONE OF the latest developments in processes of extruding metals is use of split dies to produce intricate, longitudinally-tapered sections, such as I-beams. The so-called split-die technique is a departure from conventional extrusion methods because it utilizes dies that can be moved laterally during extruding. Ordinarily, dies are stationary in the extrusion press.

The split-die method and other extrusion techniques are described by three engineers of Loewy Construction Co., in an article in the current issue of "Mechanical Engineering," publication of American Society of Mechanical Engineers.

Text Explains Method — The authors point out that extrusion presses are now being used to produce longitudinally tapered, step and multi-shouldered extrusions, as well as combination die forgings and extrusions.

Improved press design, increased capacity and the introduction of automatic die changing have helped to make the extrusion of complex shapes possible. To produce step extrusions, for example, a method has been devised to change the split dies automatically with a minimum of cycle interruptions. System has been incorporated on a new 20,000-ton extrusion press.

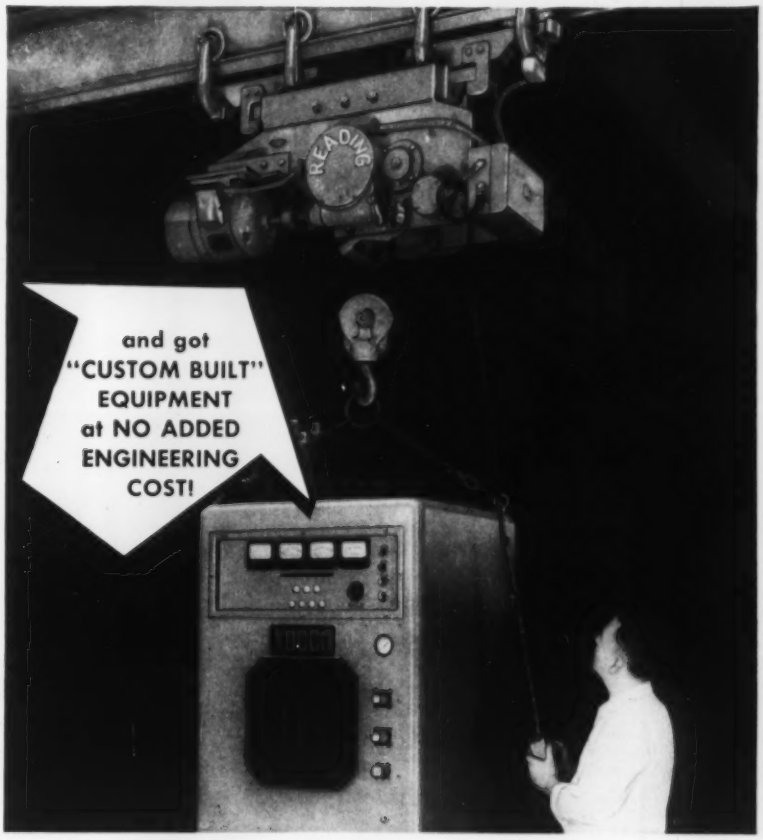
Promise for Aluminum — This system, the Loewy engineers say, shows great promise in the field of aluminum extrusion. Since required billet temperature for aluminum is low, as compared with steel, and since its plasticity is retained for long periods by container heating, the prospects in this direction are most favorable.

Cleaner Diesel Exhaust

A catalytic muffler that effectively reduces noxious and irritating components of 4-cycle diesel engine exhausts has been developed by Oxy-Catalyst Inc., Wayne, Pa.

The new device, called the Dieseler, attaches directly to the engine exhaust manifold and burns by catalytic action the noxious carbon monoxide and odorous hydrocarbon fumes in exhaust gases.

TOCCO Chose Reading Electric Hoists ...



This Reading electric hoist is moving a sheet metal cabinet from a heating station to the production line. All Reading hoists at Tocco have the same two-button pendant control.

● Rapidly rising production goals are being met in Ohio Crankshaft's new Tocco Division plant in Cleveland's South Side . . . thanks partly to Reading Electric Hoists.

Tocco, a leading producer of induction heating equipment, designed the new plant to meet the needs of its rapid expansion. Pre-planned materials handling, involving trucks, bridge cranes and electric hoists, is paying off in fast, orderly movement of materials from operation to operation.

Playing a big role in this integrated handling system is a series of Reading electric hoists, "custom-built" from standard Reading units to meet the exact requirements of each operation. These hoists permit Tocco workmen to move all material without manual lifting.

Reading's unique "Unit Construction" plan offers you special equipment for your own plant at the low cost of standard parts. Investigate now this proven way to get faster, better materials handling. A note on your company letterhead will bring a Reading engineer to analyze your handling operations . . . at no obligation.

Reading Crane & Hoist Corporation, 2102 Adams St., Reading, Pa.

READING HOISTS

CHAIN HOISTS | OVERHEAD TRAVELING CRANES | ELECTRIC HOISTS

A AVAILABILITY
S SERVICE
Q QUALITY

you get all three with

B & W CARBON STEEL

SEAMLESS

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Buying convenience through a single source of hot-finished and cold-finished carbon steel tubing, produced in a wide range of grades and sizes.

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You can save through the dependable assistance of B&W Regional Representatives and qualified distributors, trained to help solve fabrication problems and to assist in tube selection.

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Mechanical properties, machinability, tolerances and surface finishes combined for ease of fabrication in your specific application.

remember A S Q *is meant for you.*

B&W SEAMLESS and WELDED TUBES

THE BABCOCK & WILCOX COMPANY
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Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

TA-4048 (CSM)

Prototype Production

PRODUCTION costs for prototype models of General Electric Co. appliance parts have been cut drastically by using Bakelite Co.'s vinyl resins in a new flexible mold process. Production time is also slashed in casting electric iron handles, fan motor casings and electric clock cases with plastics.

Casting intricate detail or thin wall sections of production parts is simplified by the flexibility of the mold. The molds are made of plastisole, produced by Elastomer Chemical Corp., Newark, N. J.

Better, Faster, Cheaper—To cast a dozen sample parts from a temporary metal mold previously cost about $2000 according to General Electric.

Now same parts are cast from a flexible mold at a cost of $300. The simplest plaster mold takes 4 hours to make, compared to 1½ hours for the same flexible mold.

Flexibility combined with abrasion resistance also yields more castings per mold, and castings remain uniform throughout an entire run.

Fast Hydrogen Analysis

An analytical process which shows promise of being fast and accurate enough to study hydrogen during steelmaking has been installed at the U. S. Steel Research & Development Laboratory, Pittsburgh.

The new technique makes possible analysis of a properly-prepared sample in about 15 minutes, by means of a thermal conductivity cell. Its probable error: Only plus or minus 0.12 parts per million.

The method is applicable to the analysis of multicomponent mixtures when all gases in the mixture except one have nearly the same thermal conductivity. The mixture of hydrogen, nitrogen and carbon monoxide evolved by the tin-fusion analysis falls into this classification.

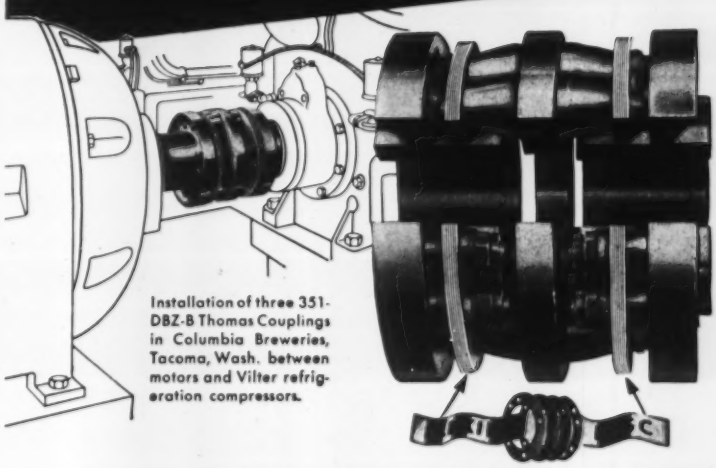
Thermal conductivities of nitrogen and carbon monoxide are practically equal, while that of hydrogen is approximately seven times that of the other two gases. Thus, the thermal conductivity of the mixture at known temperature and pressure can be related directly to percentage of hydrogen by suitable calibration.

Disconnecting Rods

Connecting rod forgings for automotive truck and diesel use commonly are made as one-piece forgings. After partially machining them in this state, the cap is split from the shank of the connecting rod, then reassembled by bolts for final machining operations.

A machine which accurately saw-cuts the cap from the connecting rod has been designed and produced by Motch & Merryweather Machinery Co., Cleveland O. Machine consists of right-hand and left-hand sawing heads mounted on hardened and steel ways on a base of suitable proportions. Saw heads carrying high speed steel triple-chip circular saw blades are fed by hydraulic cylinder simultaneously from each side of the forging to part the cap from the shank.

THOMAS FLEXIBLE COUPLINGS...
for more years of better service!



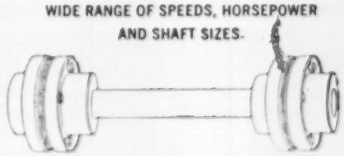
Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.

THOMAS COUPLINGS ARE MADE FOR A WIDE RANGE OF SPEEDS, HORSEPOWER AND SHAFT SIZES.



Write for our new Engineering Catalog No. 51A

THOMAS

THOMAS FLEXIBLE COUPLING COMPANY
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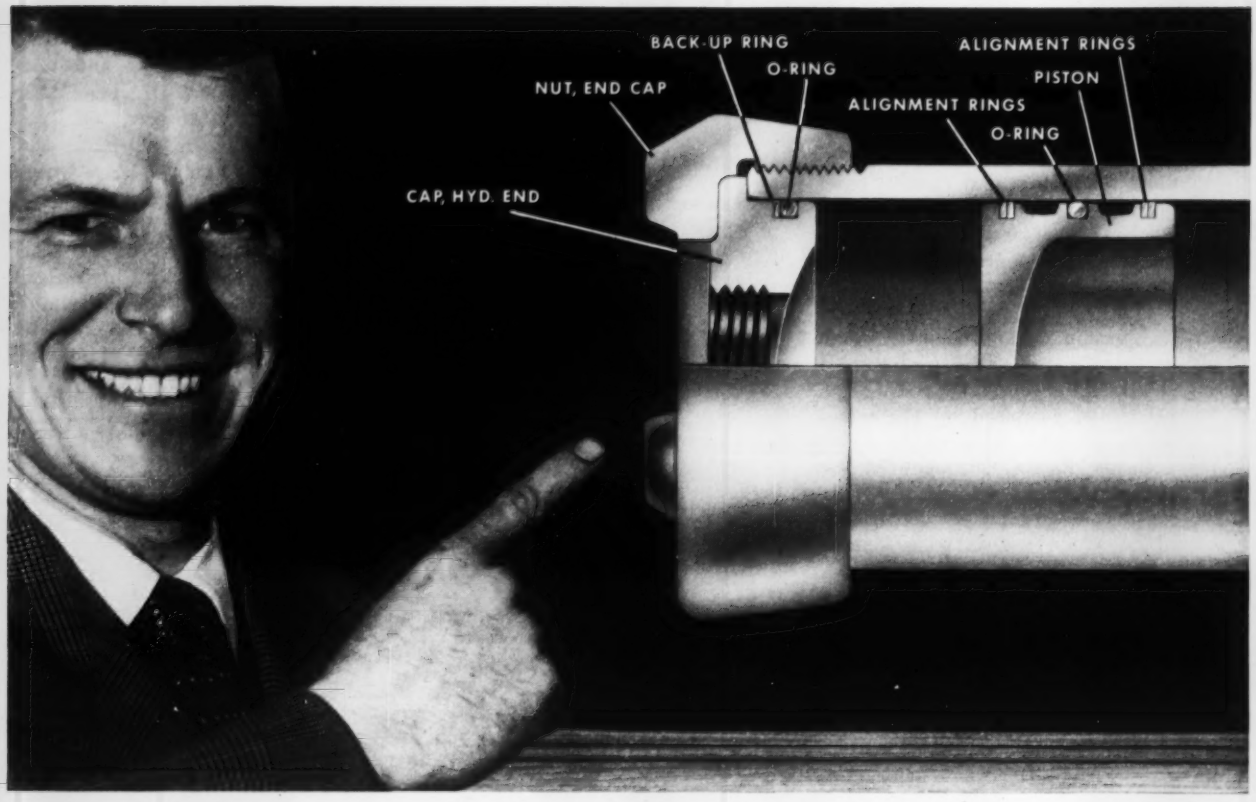


Introducing new Parker

Unique design avoids wear and maintenance, provides longer life than other types

Here at last is an industrial hydraulic accumulator that provides a longer life than conventional types.

As you see in the cutaway, construction is simple. The shell is corrosion-resistant alloy steel; the piston is aluminum. Wiper alignment rings support the piston. O-rings are used only to seal fluid and pressure. This unique design reduces frictional wear to a minimum.

The new Parker accumulator is designed for greater safety, too. During dismantling, a safety vent in the end cap warns of trapped gas pressure. It allows this pressure to escape before the end cap is removed completely.

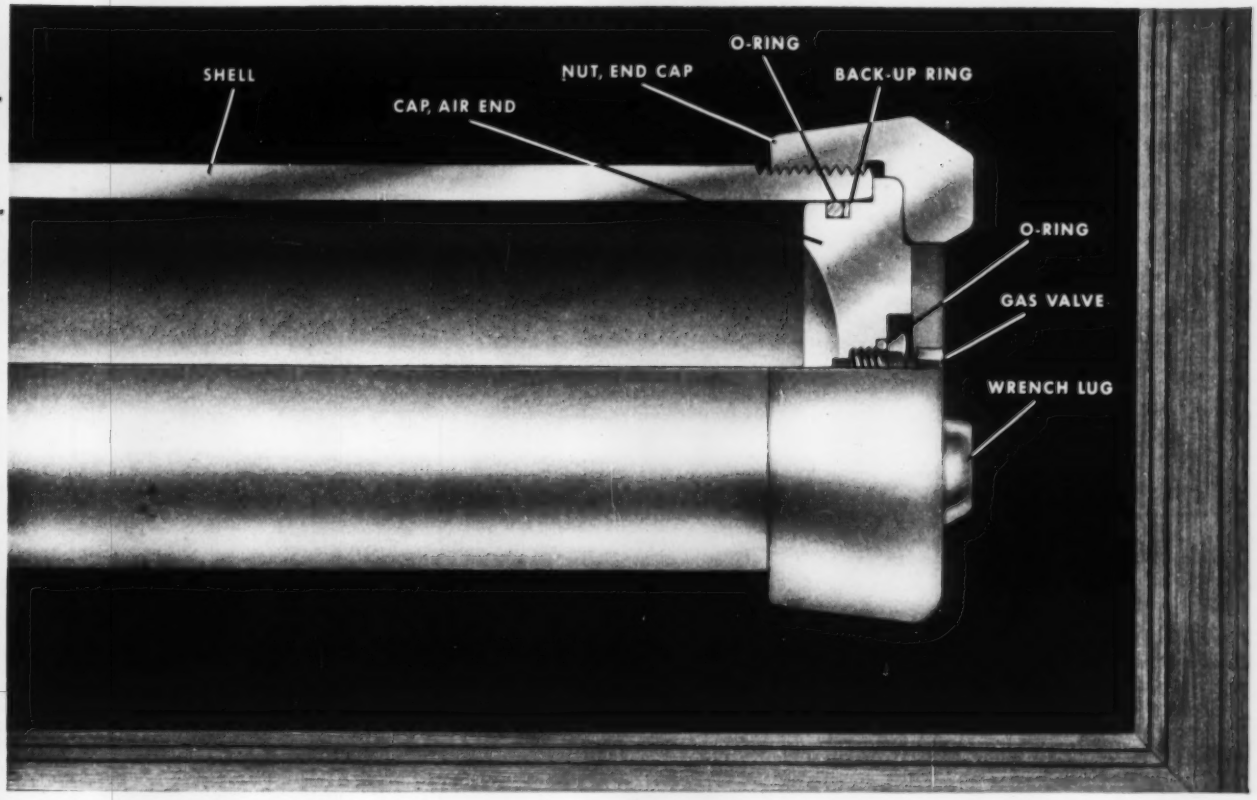
This new accumulator is offered in eleven sizes. Lengths vary from 9⅜ to 40 inches. Inside diameters are 1½, 4, or 7 inches. Oil volume capacities range from 10 to 1155 cubic inches. Maximum operating pressure rating is 3000 psi.

Also, for accessory use with accumulators, Parker offers a complete line of quick-opening, no-chatter check valves.

If you're not using accumulators, you'll find they can greatly simplify hydraulic system design, providing a means of steady power and saving wear on pumps. For information, mail the coupon.

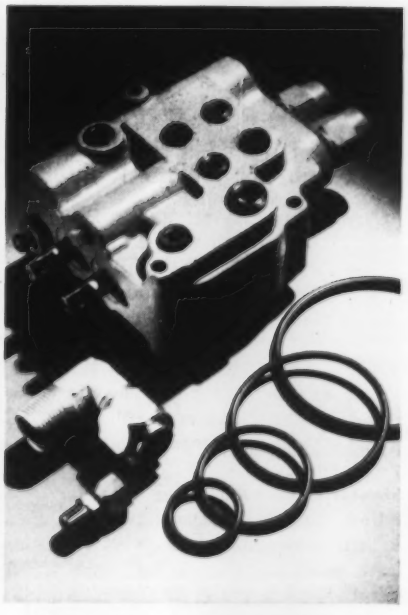
INDUSTRIAL HYDRAULICS DIVISION
The Parker Appliance Company
17325 Euclid Avenue, Cleveland 12, Ohio

Parker
Hydraulic and fluid system components



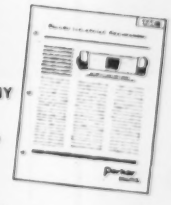
piston-type accumulator

100% safety tested on stands like this, all Parker industrial accumulators are checked at hydraulic pressures up to as high as 10,000 psi.



What other Parker products for hydraulic and fluid systems interest you? Triple-lok flare fittings? Ferulok flareless fittings? Synthetic rubber O-rings? Any other products?

THE PARKER
APPLIANCE COMPANY
Section 202-N
17325 Euclid Avenue
Cleveland 12, Ohio



Please send the following:

☐ Accumulator Catalog File 1536A

☐ Catalogs describing these other Parker products_____

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Mail this coupon for technical information about Parker's trouble-free accumulator. If you'd like to know more about other Parker products, list them on the coupon.

Work above by Brooks & Perkins Inc., fabricator of deep-drawn magnesium parts, opens up new possibilities in design and use of titanium. Parts pictured were made in single hot draws with RC-55, RC-70 and RC-130A.

It had been assumed that titanium required multiple draws and intermediate anneals. Now it appears that anything that can be drawn in magnesium in one operation can be similarly drawn in RC-55 and RC-70.

RC-130A is more difficult to draw, but progress is being made. So the prospects are that titanium, like magnesium, can be drawn more severely in one operation than metals such as aluminum, steel and brass.

NOW YOU CAN USE TITANIUM

By C. I. BRADFORD
Vice President and Director of Operations
Rem-Cru Titanium Inc.
Midland, Pa.

As mass production lowers cost, non-defense users will be taking a first look at this material. If the "rules" are followed, not too much trouble should be anticipated

IT'S time to sit back and take a considered look at titanium as a basic material.

If you are in the market for a metal between aluminum and stainless steel in terms of modulus, density and elevated temperature strength, titanium can do the job. Forty per cent lighter than stainless, its useful strength ranges up to 800 to 1000° F—some experimental alloys promise even higher service temperatures. Other interesting features include high melting point (2730 to 3135° F), low thermal conductivity and low coefficient of expansion.

If you need a structural material that is impervious to sea water and marine atmospheres, titanium is a good metal for the job. This all-out protection is extended to chemical atmospheres that destroy other metals, such as concentrated nitric acid and strong alkalies. It's not recommended for service in mineral acids (unless oxidizing agents are used), formic acid or dry chlorine.

Similarities—Like other metals, titanium can be fabricated in all standard wrought forms.

Like most metals, in its "commercially" pure state, titanium is soft and ductile.

Like most metals, the strength and other properties of titanium can be improved by adding other elements in small amounts. Rem-Cru, for example, has two alloys. Manganese is the principal alloying element in one, manganese and aluminum in the other.

Selection—Here at Rem-Cru we use crystal structure to typify performance that can be expected.

Alpha-type stands for all-around performance, which includes good weldability, toughness and strength cold and hot and resistance to oxidation. Its shortcoming is bendability.

Beta stands for bendability, hot and cold strength. But this structure is vulnerable to contamination.

C (or combined alpha-beta)

stands for compromise performance. This structure is strong cold and warm, has good bendability, moderate contamination resistance and excellent forgeability. It is weak when hot.

Identification—We use the ABC system to classify our four grades—A-55 and A-70 are "commercially" pure. C-110M and C-130AM are alloys. Former contains 8 per cent manganese; latter, 4 per cent manganese, 4 per cent aluminum.

Here's the breakdown: A or C prefix shows crystal structure. Number represents minimum yield strength (in 1000 psi) in tension at 0.2 per cent offset. Suffix indicates major alloying element—M for manganese; AM for aluminum and manganese.

These grades are produced in all standard wrought forms—plate, sheet, strip, billets, bars, wire, forgings and tubing. C-110M is a sheet and plate alloy; C-130AM is essentially a bar and forging alloy.

Structure—Basic phase diagrams show that titanium transforms from hexagonal alpha to body-centered beta at 1625° F. Increasing amounts of common alloying elements progressively drop the lowest temperature at which the structure is entirely body centered. A point is finally reached at which it has that structure below room temperature.

For maximum formability, beta has an important edge over alpha. Bend ductility of an alpha-beta alloy roughly reflects the proportions of the two present—the more beta, the better the bend. C-110M, for example, has unstrengthened alpha. Its good bend ductility recommends it for sheet forming.

Heat — As temperature is increased or decreased, proportions of alpha and beta change—by a shearing movement of atom planes. Any hot-working operaton will initiate these movements, which co-operate with external stresses and result in lower strength.

Generally, forging temperatures are a compromise between increased plasticity at higher temperatures and decreased oxidation at lower temperatures. Beta is more vulnerable than alpha to oxidation. So aluminum in C-130AM allows higher forging temperatures than C-110M.

Alloying Elements — Alpha is promoted by a group that includes carbon, oxygen, nitrogen and aluminum. The group that promotes beta includes hydrogen, manganese, chromium, molybdenum, iron, vanadium and columbium.

Presence of 8 per cent manganese raises yield strength of C-110M to over 110,000 psi. Four per cent aluminum and a like amount of manganese give C-130AM a yield strength of at least 130,000 psi.

At room temperature, C-110M has a typical tensile strength of 130,000 psi. The same value for C-130AM is 150,000. A-55, in contrast, has a typical tensile of 75,000 psi.

Hot Strength—A-70, for example, is superior to AISI 301 stainless above 600° F on a strength-weight basis; it also beats out aluminum at 400° F. Alloys are good up to 1000° F.

Obviously, where severe deformation is the need, as in deep drawing sheet, better results are obtained at 500 to 800° F. Strength is lower and the tensile-yield ratio is much greater.

If, for example, a titanium alloy has a yield strength of 115,000 and a tensile strength 130,000 psi at room temperature, these values fall off to 65,000 and 95,000 at 600° F.

Stress Rupture, Creep — Short-time tensile properties are important in heavy, shock loads, but the design engineer usually is more concerned with stresses sustained over long periods.

Time-deformation curves for titanium show a relatively rapid

TITANIUM IS AVAILABLE TODAY

Titanium mill products are available in all forms for prompt delivery, according to Mr. Bradford. He told STEEL:

"This seems at odds with the fact that the material is controlled by allocation and also with the recent report of critical shortages in the years ahead. This situation is not abnormal, however, in a new industry which is expanding so rapidly.

"Oversupply is a result of a recent three-fold increase in capacity of one of the sponge makers, and because of the reluctance of design engineers to assume that the material will be available to them until concrete evidence is exhibited.

"It is expected that this condition will be short-lived, and that demand will again approach the supply, and, thereby, provide incentive for further industrial expansion."

This is the first of a series of five articles on titanium by Mr. Bradford. In succeeding issues of STEEL, he will discuss grinding tips, hot working, forming and heat treating and metallography.

As director of research at Remington Arms Co., Mr. Bradford launched a diversification program early in 1947 to expand the company's interests outside of arms and ammunition. Titanium was the answer. As a result of investigations into the alloying and fabrication potential of the metal the same year, he was placed in charge of pilot production, sales and general development.

Rem-Cru Titanium Inc., jointly owned by Remington and Crucible Steel Co. of America, was formed in 1950, and Mr. Bradford was appointed director of operations. Last June the additional title of vice president was conferred upon him.

Under his direction, the operation has grown from a pilot plant to a tonnage business. Production is now better than 25 tons a week, and a current expansion program will increase output three or four fold by the middle of 1954

CHARACTERISTICS OF TITANIUM ALLOYS

Advantages	Disadvantages
All-Alpha	
Useful strength to almost 1200° F.	Sheet bend ductility not so good as alpha-beta alloys, considerably poorer than beta alloys.
Resistant to air contamination to 2000° F, permitting higher forging temperature.	
No embrittling heat treatment response. Weld ductility and strength comparable to that of base metal. Tough at low temperatures.	Requires more power than alpha-beta alloys for hot working.
Combined Alpha-Beta	
Double the strength of unalloyed titanium and about as strong below 600° F as all-alpha and all-beta.	Has heat treatment response that results in loss of ductility, if not controlled.
Good ductility, including bend.	Poorer weld ductility than alpha.
Forging, rolling and forming easier than alpha and beta alloys (beta has better bend ductility).	Temperature ceiling for useful strength about 800° F.
Relatively simple to produce in quantity.	
Heat treatable to high strengths.	
Heat Treatable Beta	
Quenchable to give medium strength with high ductility.	Embrittled by 24 to 96 hr at 350 to 800° F. Control of composition critical.
Can be heat treated to higher strength (with some loss in ductility) after fabrication.	Restricted to parts that can be heat treated after fabrication or require little forming after heat treating.
Elevated-temperature properties similar to alpha-beta alloys.	Requires relatively high content of strategic alloying materials.
Non-Heat Treatable Beta	
Excellent ductility, particularly bend. High strength useful to approximately 1000° F.	Greater springback in forming.
Does not require heat treatment for high strength.	Uses higher content of strategic alloying materials than unstable beta.
No heat treatment response. Good weldability with some compositions.	Relatively high density.

initial rate of deformation that decreases until the rate becomes a minimum constant during second-stage creep.

It is significant to note that the minimum creep rate curve does not follow the yield strength curve, which brings up another point. In the intermediate temperature range, stresses considerably above yield strength must be imposed to produce appreciable creep. But at near room temperature and above 700° F, creep is observed at stresses below the yield strength of the material. Reasons for this behavior are not fully known.

One would normally expect poor creep resistance to get worse as temperatures are increased, but this is not true of titanium. There are two possible explanations. Increased creep resistance in the intermediate temperature range may result from strain aging that adds strength and creep resistance. It is also possible that the mode of deformation may change with strain rate and temperature.

Fatigue — Generally, "commercially-pure" titanium has excellent fatigue characteristics in the smooth and notched conditions. Ratio of endurance limit to tensile strength for smooth specimens of A-70 (0.65) is somewhat higher than ordinary values for steel (0.45 to 0.55). Ratio of notched to smooth endurance limits also indicates the material is not unusually notch sensitive.

Work with C-110M confirms the fact that titanium is an important material of construction for applications requiring adequate endurance limits. Tests on C-130AM include an interesting study with bolts made from this material and steel. Although data are still being accumulated, this titanium alloy shows considerable promise even though its strength is slightly under the 160,000 to 180,000 psi typical of steel bolts.

Hardness—Conventional methods are used to find this value, but difficulty arises in attempting to correlate hardness results with (1) other test data, such as tensile strength; (2) with similar data obtained on the same machine; or (3) from material processed in slightly different ways. Hardness of titanium seems to turn on many variables that probably have negligible effects on other metals.

Rem-Cru recommends that data obtained from hardness tests on titanium should be used with care. Inspection practices should be based on tensile tests, even though they are more expensive and time consuming.

Corrosion Resistance—This feature deserves special mention. The mechanism is believed to involve the formation of a protective film of stable oxide or chemi-adsorbed oxygen. Film is often protected by the presence of oxygen and oxidizing agents. Attack of some corrosive media is often inhibited by impurities and minor components of commercial solutions.

Lab tests with acid and saline solutions show titanium polarizes readily. Net effect, in general, is to decrease current flow in galvanic and corrosion cells. Corrosion currents on the surface of titanium and metallic couples are naturally restricted. This partly accounts for good resistance to many chemicals—also that the material may be used with some metals with no harmful galvanic effect on either.

Corrosion of titanium is uniform. There is little evidence of pitting or other serious forms of localized attack. Normally, it is not subject to stress corrosion, erosion corrosion, corrosion fatigue, intergranular corrosion or galvanic corrosion.

NO JOB TOO HOT ...OR TOO TOUGH *for THESE cutting torches!* *

* VICTOR'S NEW
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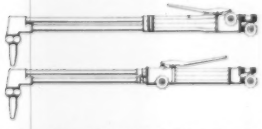
Series 1100
CUTTING TORCHES



CHOICE OF LEVER POSITION . . . cutting oxygen lever pivots from top rear of handle on Series 1000; from top front on Series 1100. Both Underwriters' approved. Available with 45°, 75°, 90° or 180° heads, to take all VICTOR standard-type tips.

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without a flashback . . . solid stainless steel mixing tube absorbs heat slowly, keeps gases below flashpoint.

LAST LONGER UNDER ROUGH, TOUGH USE
because they're made of toughest materials . . . special heat resisting bronze heads, stainless steel tubes, forged brass bodies.

EASIER TO HANDLE, EASIER TO MAINTAIN
. . . hand-fitting oval shaped bodies, perfect balance give precise control. Design is simplicity itself; you can take either model apart completely, then reassemble it, all in less than 5 minutes!

Make your tough jobs easy, your easy jobs a pleasure — see your VICTOR dealer now!

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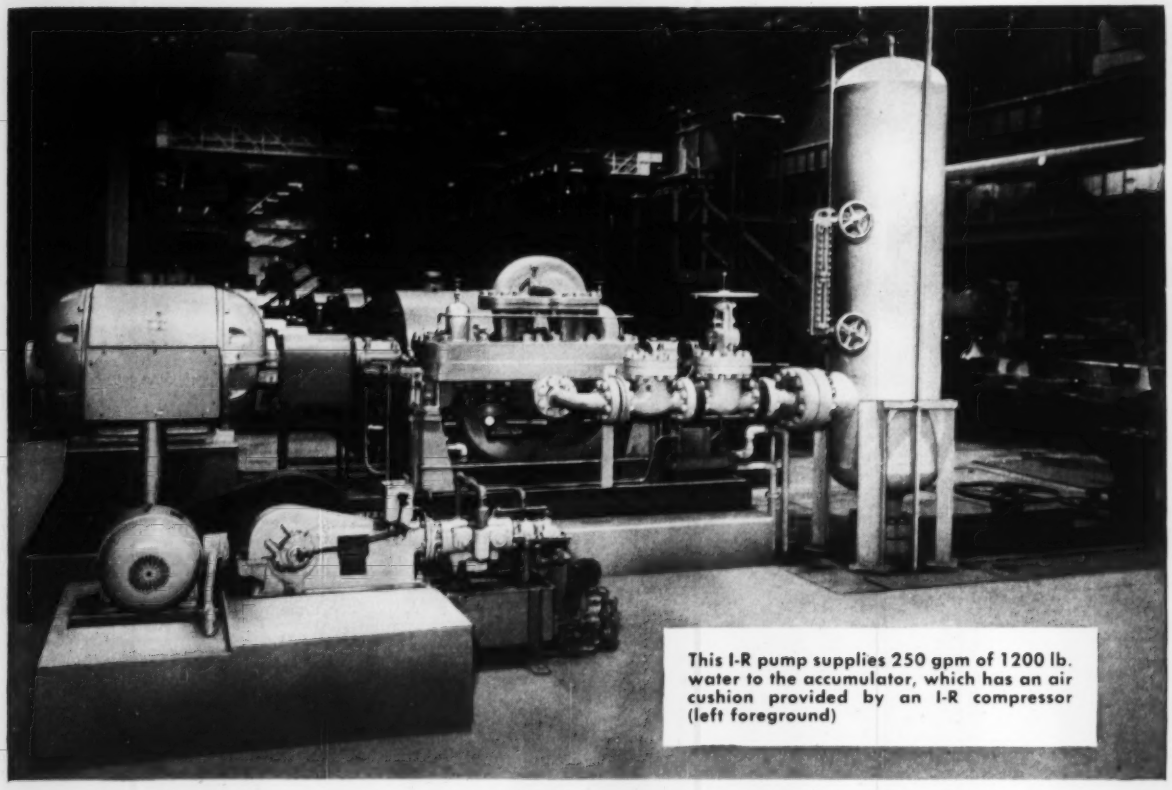

This I-R pump supplies 250 gpm of 1200 lb. water to the accumulator, which has an air cushion provided by an I-R compressor (left foreground)

BILLETS ALWAYS "COME CLEAN" AT J&L's NEW 10 INCH BAR MILL

Plant's High Pressure De-scaling System is Served by Ingersoll-Rand Pump and Compressor.

Jones & Laughlin engineers have taken every precaution to assure dependable service and long life from the de-scaling equipment installed in the new 10" bar mill at the Pittsburgh works. An Ingersoll-Rand 8-stage Class RT pump is used to feed water to the system, while a Type ER 2-stage compressor supplies air to the accumulator.

The pump is a heavy-duty opposed-impeller type specially developed for this service. It has force feed lubrication to both bearings and provision for minimum flow at shut-off.

The 1200 pound air supplied to the accumulator by the I-R compressor acts as a cushion to protect the pump against hydraulic shock damage from sudden valve closures.

For 40 years Ingersoll-Rand has been the foremost builder of blast furnace blowers, centrifugal pumps, compressors, condensers and drilling equipment for steel plants throughout the world. The wealth of specialized experience built up during this time is at your service. You are invited to take advantage of it. There's an I-R branch near you that will competently handle your inquiry.

Ingersoll-Rand

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COMPRESSORS • GAS & DIESEL ENGINES • ROCK DRILLS • PUMPS • TURBO-BLOWERS • AIR & ELECTRIC TOOLS

Tumble Plating

SMALL ALUMINUM parts are Alodine plated inside a power-driven tumbler at Temco Aircraft Corp. Recently introduced at the Dallas factory, the portable tumbler has shaved eight man-hours per shift off time required for plating.

Small parts formerly were arranged in wire baskets for their 2 to 3 minute dip. Job was a full-time task for at least one man per shift, because parts were spaced so no two would become moisture-sealed and all surfaces would get full exposure to the bath.

By keeping parts and solution in motion, it insures thorough bathing of all surfaces. The cage speeds plating and it further removes workers from possible contact with the solution.

Machine Anatomy—Tumbler is hexagonal with 16-gage stainless steel walls. Walls are perforated with ½-inch diameter holes. Tumbler is 4 feet, 3½ inches long and 2 feet, 2 inches wide.

Inside, three perforated partitions are secured by stainless steel angles. Partitions permit segregation of four different varieties of parts, or they can be removed to admit parts up to 4 feet long.

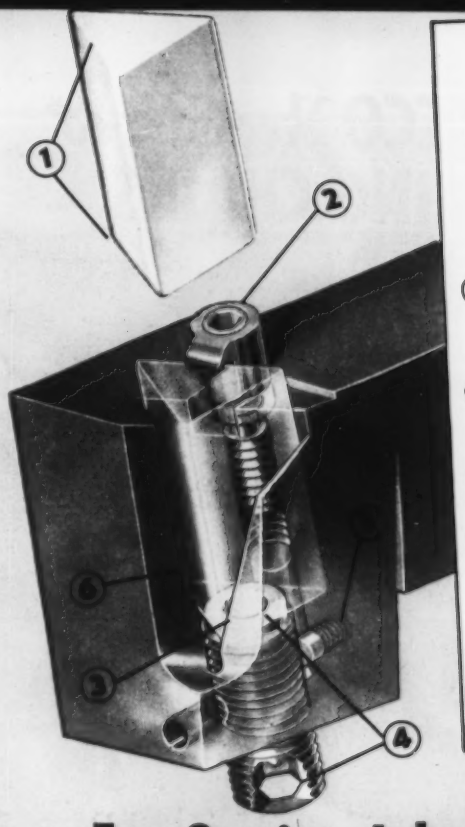
A stainless steel flange runs from end to end on each outside face of the hexagon. These fins act as stiffeners and as agitators to keep the plating solution in motion.

Radiation Hazards Handbook

National Bureau of Standards has published a handbook entitled "Protection Against Betatron-Synchrotron Radiations up to 100 Million Electron Volts." It is one of many of the handbooks published by the bureau intended to serve as a guide for protection against the general hazards of radiation sources.

The present handbook attempts to supply these recommendations as they apply to high energy electron accelerators of the betatron and synctrotron types.

Copies may be obtained by writing to the Government Printing Office, Washington 25, D. C. The handbook is priced at 25 cents.



FEATURES of TOP-CLAMP KENNAMATICS*

1. Indexable Kennametal* insert, pre-ground on both ends—provides six or more cutting edges (depending on style) before sharpening is required.
2. Rugged clamp and screw is interchangeable on all standard Kennamatic styles and sizes.
3. Hollow back-up screw facilitates removal of snug-fitting (frozen) insert.
4. Hex sockets on both ends of back-up screw for quick adjustment or changing of insert, from either top or bottom.
5. Nylon plug, and spring, for friction locking of back-up screw.
6. Ample clearance at front of holder eliminates shank abrasion from "chip wash."

...For Getting Jobs Done FAST!

Kennamatic* features help get the most out of a machine because there's far less downtime for tool changing when you put these multiple-edge, indexable insert tools to work. For example:

Conventional brazed carbide tools, used to rough turn SAE 1140 sleeve yokes, machined only 100 to 125 pieces per grind, and 1000 to 1250 per tool life.

Kennamatic tools were put on the job. Operating conditions and machining time remained the same, BUT—9 times as many pieces are now turned per tool grind, and 10½ times as many per tool life.

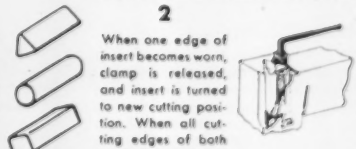
Tool cost is now only one-sixth of the former amount—and production is higher because of less downtime.

Kennamatic inserts have Kennametal's high hardness and wear-resistance for long life. Clamped-in, they can be indexed in seconds to new cutting positions without removing or resetting the tool . . . a great time-saving feature. After all cutting edges at both ends of an insert have been used, they are resharpened by squaring off the ends and grinding chip breaker, if desired—no precise angles to form; no steel to grind.

Only Kennametal makes Kennamatics. Ask your nearest Kennametal tool representative to help you apply this cost-saving tooling to your production or job lot operation. Kennametal Inc., Latrobe, Pa.

HOW KENNAMATIC* WORKS

1. Kennamatic* insert—round, square, triangular, or diamond shaped—is precision ground. It is placed in holder, adjusted to cutting position with back-up screw, locked into place by tightening clamp nut.



2. When one edge of insert becomes worn, clamp is released, and insert is turned to new cutting position. When all cutting edges of both ends have been used, the insert is easily reground.

3. Worn inserts are sharpened simply by facing off both ends.

Back-up screw is adjusted (from either top or bottom) to bring cutting point to center.

*Registered Trade-Marks

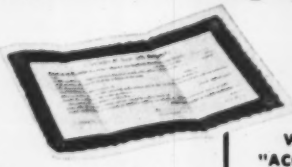
KENNAMETAL*
CEMENTED CARBIDE TOOLING THAT INCREASES PRODUCTIVITY
SALES OFFICES IN PRINCIPAL CITIES

A-13

ACCO Registered* SLING CHAINS

You get more than chain when you buy ACCO Registered Sling Chains

• This 125,000 psi ACCO *Registered* alloy sling chain has great strength, yet it's lightweight and easy for men to handle. It will lift a variety of expensive loads safely over costly machines. You can be sure of that because it's ACCO *Registered.*



ACCO *Registered* is more than a name. It's more than a registered trade mark of American Chain & Cable. It is the standard by which all other slings are judged. It means that you can equip your shop with dependable "lifting tools" specifically designed for highest efficiency and long life by trained engineers who spend all their time designing and testing slings.

A survey of your sling requirements will cost you nothing. See your ACCO *Registered* Sling Chain distributor today or write our York, Pa., office for details. *Trade Mark Registered

WHAT "ACCO REGISTERED" MEANS . . .

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2. Unit safety factor (on bodies, rings, links, hooks)
3. Proof test of complete sling to twice the working load limit
4. Actual field service test of each design
5. Metal identification ring on each sling
6. Signed Registry Certificate with each sling

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Vapor Blasting

A VAPOR BLAST, Roto Finish Department has been set up at the Ford Aircraft Engine Division, Chicago, for finishing parts for the J-57 jet engine.

One of the jobs that has established the value of the finishing method supplied by vapor blasting is an 80 per cent reduction in time required to finish an aluminum diffuser. Originally it took 11 hours to develop the specified finish. With introduction of 17 minutes of vapor blasting, the job was cut to 2 hours.

Prior to Coat—The vapor blast liquid honing process produces a metallurgically clean surface prior to plating, polishing, lapping or other coating processes. It is also used to remove machining or direction polish defects.

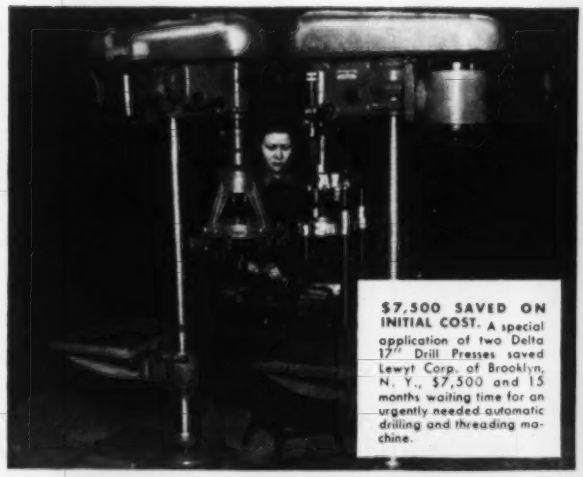
In addition, liquid honing process is applied to produce a controlled and wet table surface to retain lubricants uniformly. Process also removes fine burrs on metals and alloys, resulting in a matte finish which increases the tensile strength and relieves stress concentrations through impact.

Finish Is Necessary—This finish is necessary on gears to release grab from metals and to reduce noise in gear trains by giving a nondirectional finish to retain and evenly distribute the lubricant. A controlled action roto finish can remove heavy burrs or attain precisely uniform surface to exact tolerances easily, economically and in large quantities.

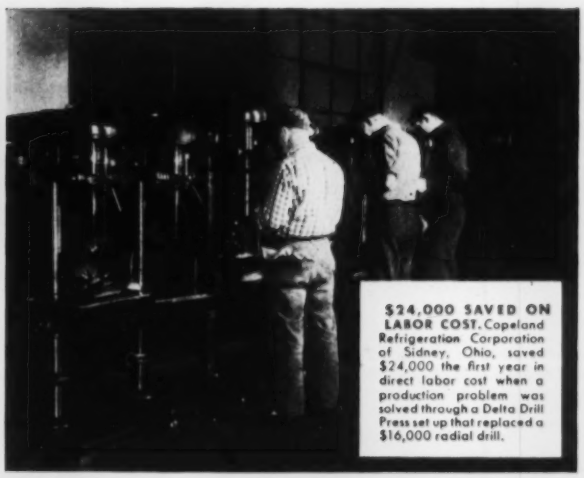
A similar, even more precisely controlled operation, is afforded in an adaptation of the vapor blasting process where a tumbling barrel is introduced into the vapor blast cabinet and a fixed gun applies the abrasive solution.

Deep Case Hardening

A new method of case hardening gear and sprocket teeth, at the same time they are being machined, which permits close control over depth as well as area of hardening is announced by Cogmatic Co., Milwaukee. The process employs a combination of flame preheat, flame machining of toothed form and quenching, all in one automatic operation.

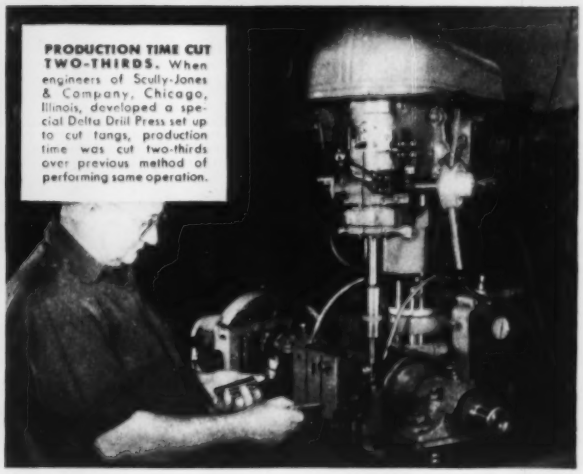


$7,500 SAVED ON INITIAL COST. A special application of two Delta 17" Drill Presses saved Lewyt Corp. of Brooklyn, N. Y., $7,500 and 15 months waiting time for an urgently needed automatic drilling and threading machine.



$24,000 SAVED ON LABOR COST. Copeland Refrigeration Corporation of Sidney, Ohio, saved $24,000 the first year in direct labor cost when a production problem was solved through a Delta Drill Press set up that replaced a $16,000 radial drill.

MATERIAL HANDLING COSTS SLASHED. Sangamo Electric Company, Springfield, Illinois, eliminated costly trucking and handling through use of Delta sectional table drill press set ups, with operator moving from one machine to another.



PRODUCTION TIME CUT TWO-THIRDS. When engineers of Scully-Jones & Company, Chicago, Illinois, developed a special Delta Drill Press set up to cut tangs, production time was cut two-thirds over previous method of performing same operation.

Four Basic Problems: ONE SENSIBLE ANSWER

(Rockwell-built DELTA Power Tools can be your answer to rising costs, too!)

If your profits are being squeezed between rising costs and stiffening competition, do what other progressive businessmen are doing. Use low-cost Delta Power Tools to supplement—and sometimes replace—heavy, expensive conventional machine tools.

Rockwell-built Delta Power Tools make possible big savings in labor, time, and material handling costs because they are so easy to move into and out of production lines, and set up in special combinations. They work to extremely close tolerances, and *stay* accurate, require a minimum of maintenance. Parts are quickly available. And Delta Power Tools are so inexpensive that they make money for their owners *even when standing idle*. They can be *kept* tooled up, saving costly set-up time.

The growing trend toward low-cost, portable, accurate Delta Power Tools amounts to virtually a "new industrial revolution"—a new kind of production thinking that is cutting costs in plant after plant. Your Delta dealer can help you cut *your* costs, too—he's listed in the classified pages of your phone book under "TOOLS" or "MACHINERY." *Delta Power Tool Division, Rockwell Manufacturing Company, 638 E N. Lexington Ave., Pittsburgh 8, Pa.*

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DELTA QUALITY POWER TOOLS

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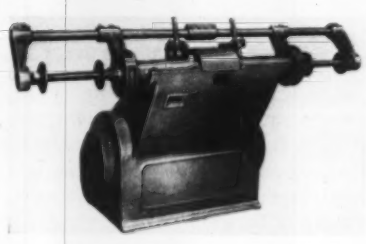
NEW PRODUCTS and equipment

Reply card on page 173 will bring you free literature, editorial clips or more information on new products and equipment described or advertised in this issue

Polishing, Buffing Machines

. . . a two-spindle lathe

Special model RRO wide swing polishing and buffing lathe is a two-spindle lathe, each spindle having its own motor, motor control and v-belt drive, allowing each operator to change wheels without interfering with or causing downtime for the other. Each spindle



runs in three ball bearings, one in the end of the spindle which is a part of the special bearing assembly.

Heavy-duty construction and rigidity of outboard bearing permits use of wheels up to 16 inches face on each spindle. Lathe is especially suited for polishing and buffing of large and irregular-shaped parts by hand polishing or in conjunction with semiautomatics. Hammond Machinery Builders Inc.

FOR MORE DATA CIRCLE NO. 1 ON REPLY CARD

Titanium Tubing

. . . commercial specs in one pass

Titanium tubing in sizes up to 1¼ inches OD, which combines high strength and light weight with good resistance to heat and corrosion, is successfully being straightened in the Norristown, Pa., plant of Superior Tube.

Operating procedures were developed so only one pass through a Mackintosh-Hemphill rotary straightener produces lengths of titanium tubing to closer than commercial specifications for straightness. Direct-current motor drives vary speed of the straighteners according to tube being straightened. A majority of product is fed into the units when set to run between one-half and full operating speed of 350 fpm. Mackintosh-Hemphill Co.

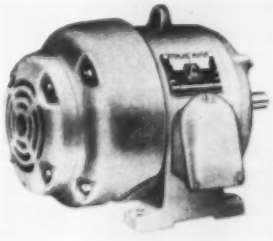
FOR MORE DATA CIRCLE NO. 2 ON REPLY CARD

Electric Motor Line

. . . meets NEMA standards

Production of advanced-design totally-enclosed fan-cooled constant speed motors, in frame sizes 182 and 184 and meeting NEMA approved standards is announced by Sterling Electric Motors.

Advantages reported: More horsepower in less space; heavy



duty ball bearings; stator windings of advanced design; new terminal boxes. The 182 and 184 frame sizes are the beginning of a complete change over in the Sterling line to incorporate NEMA standards. Sterling Electric Motors Inc.

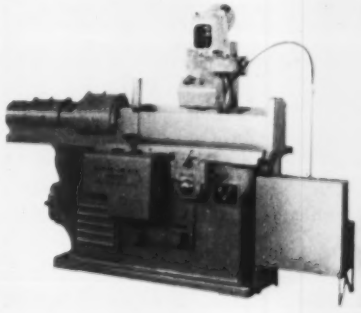
FOR MORE DATA CIRCLE NO. 3 ON REPLY CARD

Hob Sharpening Machine

. . . accommodates wet grinding

No. 10-12 hydraulic sharpening machine has been redesigned to accommodate wet grinding of high-speed steel, carbide-tipped hobs and form-relieved cutters. New wheel spindle and work spindle are fully-protected against effects of coolant. Splash guards and coolant tank and motor are extra equipment.

Wheel spindle also has been made more rigid for a finer surface finish on the faces of the



flutes. Machine handles a wide variety of tools with straight or helical flutes, shell or shank type, up to 10 inches in diameter by 12 inches face width. All elements of the machine cycle can be accomplished automatically by making proper settings on controls. Barber-Colman Co.

FOR MORE DATA CIRCLE NO. 4 ON REPLY CARD

Girth Welder

. . . for welding applications

The Universal Girth Welder is a standard heavy duty positioner mounted on a common base with a vertical column for very flexible weld head positioning.

The positioner is designed and built to machine tool precision standards and provides a rugged and accurate unit with smooth wide range table rotary speeds. The standard bored hole goes

completely through the table without interference, making possible the application of hydraulics, air, water, or gas into special fixturing through rotary joints. Jig drilled and tapped holes on the

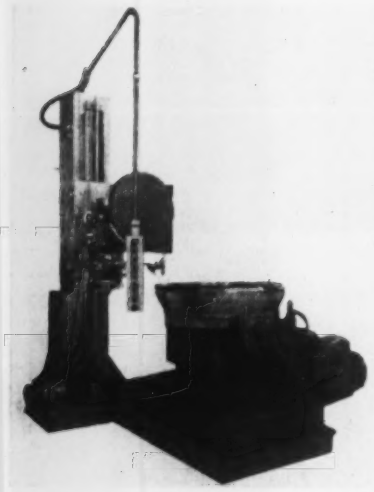


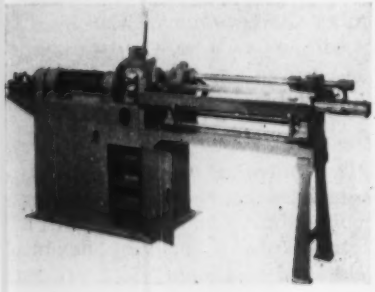
table surface offer interchangeable fixture mounting applications. All machine controls and welding cycle can be operated from a swinging pendant station. Movements are protected by limit switches. Morton Manufacturing Co.

FOR MORE DATA CIRCLE NO. 5 ON REPLY CARD

Wire-Cutting Machine

. . . with 3-roll straightener

Powered with a 5-hp, 1800-rpm motor, the Patterson wire-straightening and cutting machine is designed for 1/16-inch to 1/4-inch wire.



The fly wheel is roller chain driven; feed and speed of machine can be fitted to customers' requirements by changing the drive sprocket on the jack shaft. Bearings are anti-friction and all main bearings run in a bath of oil.

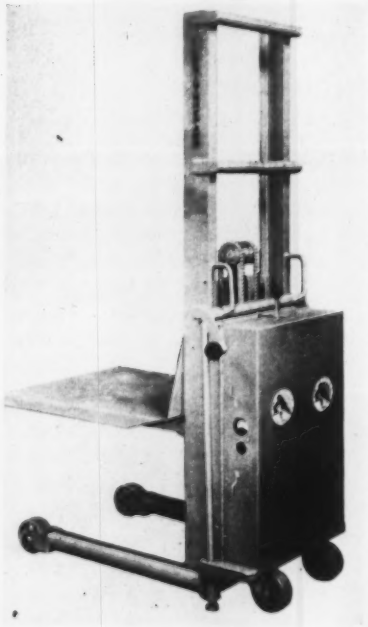
Greater feed can be attained because a three roll straightener is furnished which does a great portion of the work which the flyer or straightening arbor would normally do. The model is designed to cut lengths up to 40 inches long at the rate of 125 feet per minute. Variations of the standard model can be furnished. G. C. Patterson Machine Co.

FOR MORE DATA CIRCLE NO. 6 ON REPLY CARD

Electro-Hydraulic Stacker

. . . available in two models

Lightweight, compact electro-hydraulic stacker of 1000-pound capacity is available in two models, platform and straddle type. Former type has a carrying platform 30 x 24 inches. Latter has forks either



30 or 36 inches long and can handle pallets up to 48 inches long. Lifting height of both models is 58 inches, weight is approximately 500 pounds.

Electro-hydraulic power is furnished by a storage battery with a built-in charger that charges from any lighting circuit. Lifting and lowering of load is accomplished by a single control lever. Lewis-Shepard Products Inc.

FOR MORE DATA CIRCLE NO. 7 ON REPLY CARD

Mark Etcher

. . . single, multiple marking

Designed for production marking or individual indentification, setup time on the E-Z Mark etcher is minimized. It is particularly well

suited for marking hardened and ground surfaces, aluminum and stainless steel. It easily handles less difficult metals such as zinc, copper, steel and their alloys as well as most platings.

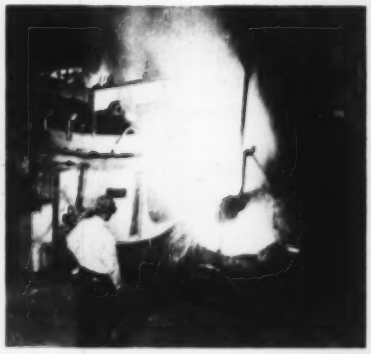
Etcher consists of a power unit and a separate tray attachment offering a simple, quick and economical method for etching almost all metals including aluminum. Crown Industrial Products Co.

FOR MORE DATA CIRCLE NO. 8 ON REPLY CARD

Arc Furnace Control

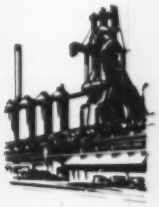
. . . motors run continuously

This control makes use of motors that run continuously and always in the same direction. Its operation is compared to the work of accelerating or decelerating an



automobile moving forward at 50 miles per hour. This speed may be easily increased to 60 miles

Industrial Cut Gears

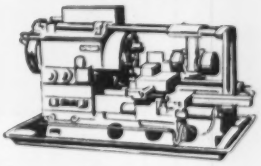


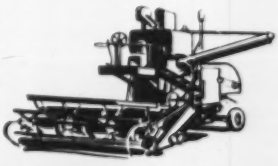
HELP TRANSMIT THE POWER THAT ENABLES

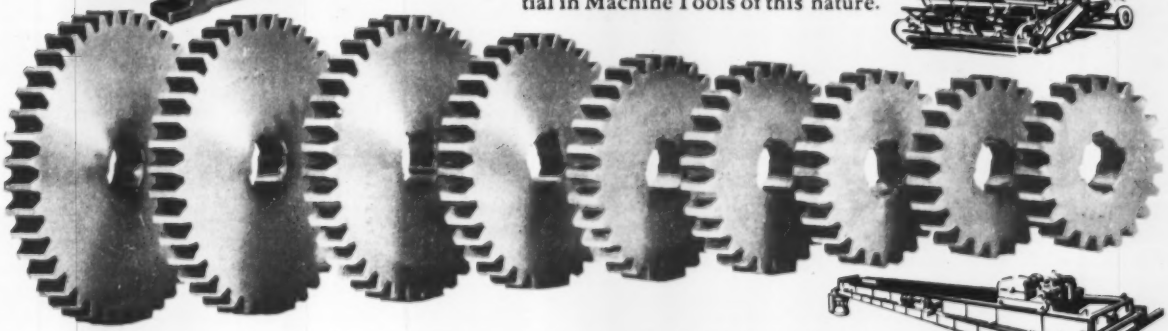
Sundstrand

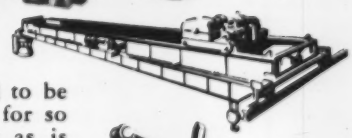
MILLS and LATHES TO FUNCTION

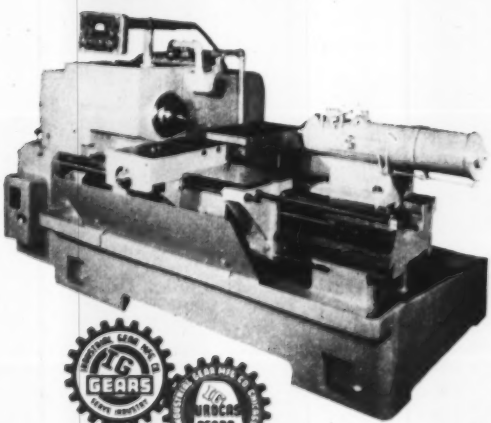
The 'Nth degree of accuracy, is a must here. And, as these Sundstrand machines assure the highest precision in milling and turning so do Industrial Cut Gears provide for the smooth operation that is so essential in Machine Tools of this nature.







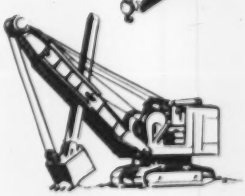




We are proud at Industrial to be factors in supplying Gears for so highly exacting equipment as is pictured here. It proves the worthiness of our product and the reliance users place upon us to meet their demands.

"IG Durocase" (Steel Mill type Gears) and "IG General Service" Gears are ready to serve you too.

May we have the opportunity to work with you?



IG GEARS

IG DUROCASE GEARS

Our plant, devoted exclusively to gear and sprocket cutting, can be visited pictorially through Bulletin No. 152-A. Write for your copy—and see how well equipped we are to handle your needs.

MEMBER OF AGMA

Industrial Gear Mfg. Co. 4545 W. VAN BUREN ST. CHICAGO 24, ILLINOIS

this

HEVI DUTY

Nitriding Furnace

GIVES US WHAT WE WANT...

Paul C. Farren, Chief Metallurgist at Hartford Machine Screw Company, says, "I like this Hevi Duty Vertical Retort Nitriding Furnace because

1. We can nitride all types of steel including stainless.
2. This Hevi Duty Furnace is adaptable to the Floe process of Nitriding.
3. We get uniformity throughout the entire load.
4. The parts come out clean and treated to very close tolerances.
5. A large pay load with low ammonia and power consumption saves us money.
6. This furnace stands up under continuous use.
7. Control is easy, giving us exacting case depths in each heat and uniformity from heat to heat."

These and the many other advantages built into Hevi Duty Nitriding Furnaces can benefit you. Write for more information today — Bulletin HD-646-R.

HEVI DUTY ELECTRIC COMPANY

MILWAUKEE 1, WISCONSIN

Heat Treating Furnaces... Electric Exclusively

Dry Type Transformers *Constant Current Regulators*

per hour, or reduced to 40 miles per hour.

Job of control in an electric furnace is to keep the electrodes moving up or down to maintain proper balance of the arc, thus achieving maximum heat. The new control eleminates stop and go action in the process. Whiting Corp.

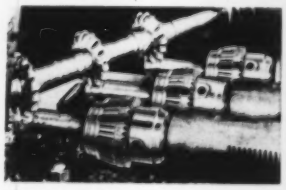
FOR MORE DATA CIRCLE NO. 9 ON REPLY CARD

Collet Chuck

. . . toolholding, workholding

Model 96 collet chuck is a toolholding and workholding chuck that permits use of Jacobs rubberflex collets on many different machine tools.

It provides outstanding collet performance on grinders, milling



machines, jig borers, jig grinders, lathes and various types of special machinery where a precise compact collet closure is desirable. It is made in two models: 96-05 is equipped with a No. 5 back mount, model 96-F1 has a flange mount. Jacobs Mfg. Co.

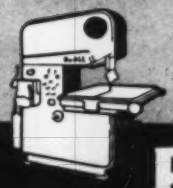
FOR MORE DATA CIRCLE NO. 10 ON REPLY CARD

Oscillator

. . . for production testing

The first product of a new corporation is the model DK-1 oscillator.

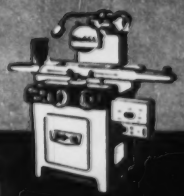
The model is claimed to produce an inexpensive source of essentially pure, highly stabilized


BAND MACHINES

BAND TOOLS

DoALL

GAGE BLOCKS


SURFACE GRINDERS

PRODUCTION NEWS

SAW BANDS • GAGING EQUIPMENT • TOOL STEEL • CUTTING TOOLS • INDUSTRIAL SUPPLIES

Vol. 3 | Published by DoALL Company, 254 N. Laurel Ave., Des Plaines, Ill. | No. 2

New Bausch & Lomb Bench Comparator Prevents Production Errors at The Machine

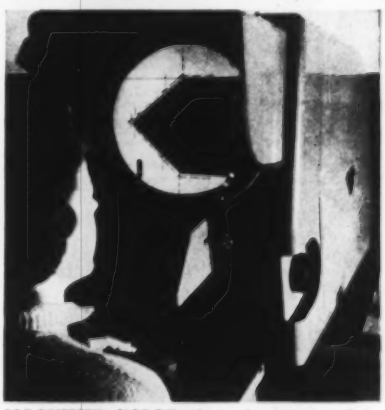
Lowest Priced Optical Comparator of its Size and Quality; Sold Exclusively by DoALL

Charts and Staging Fixtures for Comparators Also Available Through DoALL

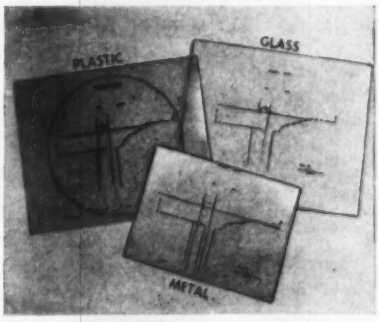
A new, low priced bench type optical comparator manufactured by Bausch & Lomb Optical Company is now available exclusively through DoALL Service-Stores. The new unit is designed for use in the shop alongside the machines to permit fast, accurate inspection of both parts and tools. It projects a magnified image of the object on a ground glass screen. The dimension or contour is visually checked against reference lines or a chart on the screen, enabling the operator to detect deviations from accuracy before tolerances are exceeded. Inaccurate set-ups, worn tools or other sources of inaccuracy can be corrected before rejections occur.

The instrument also finds application in the inspection lab and for checking of incoming parts.

TOOL WEAR CAN BE SPOTTED by parts inspection in the shop. Tools can be adjusted before error occurs.



MAGNIFIED IMAGE of single point tool is compared against reference lines on comparator screen.



DUPLICATE CHARTS can be made with perfect accuracy on glass, plastic or metal. Any number of suppliers and customers can thus perfectly duplicate production and inspection.

Measures to .0001"

Priced below any comparator of comparable quality and size, the new B&L instrument has a 10" round screen and will measure to a least dimension of .0001". It features understage illumination which eliminates the need for special fixtures when checking any part that can be laid on the horizontal stage.

The perfection of the Bausch & Lomb optical system provides extreme accuracy and a sharply defined silhouette of the object across the entire diameter of the screen.

Weight of the unit is 110 lbs., length 21", width 15", height 23".

Charts, Fixtures

Special comparator charts and holding fixtures designed and manufactured by Inspection Equipment Co., Birmingham, Michigan, are available through DoALL to provide faster, simpler checking of production runs.

New literature on comparators and charts is available upon request.

Other Optical Instruments

DoALL Stores are also distributors of Bausch & Lomb contour measuring projectors, stereomicroscopes, toolmaker's microscope, Brinell and shop microscopes.

PRODUCTION LINE CHECKING right at the machine. Operator and inspector can both see the accuracy or error.

TYPICAL APPLICATIONS

Checking contours and dimensions of:

Screw machine parts	Machine set-ups
Jet engine blades	Slots—
Cutting tools—Dies	Irregular forms
Springs—Stampings	Phonograph needles
Precision castings	Screw threads
Radio tubes	Jewel bearings
Gears—splines	Form grinding rolls
Involute coils	Keys—Razor blades
Saw Bands	and *thousands* more!

----See Next Page--->

DoALL Single Point Carbide Tools, Tips and Holders

- Finest, controlled quality sintered carbide
- Specific grades of carbides to meet every need
- All sizes, shapes

Call DoALL —consult your classified phone directory for nearest DoALL Service Store that stocks cutting tools, gages, supplies — or Write

DoALL Hefti-Cut Adjustable Tool with DoALL Pre-formed Carbide Blank

The DoALL Co.
Des Plaines, Ill. 21

DoALL Announces New Low Cost 16" Contour Band Machines

Five Models Expand DoALL Line To Meet Any Requirement

For Toolroom and Light Production Work; Variable Speeds 50 to 5200 Blade Feet Per Minute

With prices starting at $540, a new line of 16" DoALL contour band machines is available to give even the smallest shop all the advantages of modern band machining. Designed for light production and tool room work, these machines give remarkable performance within their size and power range. Quality has not been sacrificed. The low prices are made possible by DoALL design know-how and mass production manufacturing.

There is almost no limit to the jobs which can be profitably handled on the new models. Fixed and variable speed ranges are available for sawing, filing, polishing, friction sawing and carbide tool finishing. Twenty different attachments are available to increase usefulness, output and ease of operation.

Construction

Tables on all models are 24"x24" with 45° tilt to the right and 10° tilt left. Throat depth is 16", work thickness capacity 12".

Frame and housing are unit welded steel. Carrier wheels are aluminum with sealed ball bearings.

Models SFP, LSV, and HSV include a Speedmaster variable speed drive and totally enclosed hardened steel helical gear transmission. Speed ranges of these models are 50 to 5200, 50 to 300 and 850 to 5200 blade feet per minute, respectively.

The Model HS has a fixed speed of 4000 feet per minute, and the HS4 four speeds of 2000, 3000, 4000 and 5000 fpm.

Attachments

Optional equipment for the new 16" DoALL's includes saw blade buttwelders, saw blade shears, automatic power work feed, various types of saw guides, carbide tool finisher attachment, band polishing attachment, rip and mitering fences, tool coolant and air systems, screw feed and work holding jaw, disc cutting attachment, electric etching pencil for toolmaking and others.

Complete data, literature and prices are available upon request.

New 16" x 12" capacity DoALL with some of the new attachments.

Look at those smooth, uniform chips!

DoALL XL TWIST DRILLS

Guaranteed to last longer than an ordinary drill!

Call DoALL

See your classified phone directory for nearest DoALL Sales-Service Store stocking cutting tools, gages, supplies or Write

- Lower tool cost
- Less downtime
- Lower labor cost
- All sizes in stock

Try just one for comparison

The DoALL Company
Des Plaines, Illinois

DoALL OPTICAL FLATS for Checking Flatness, Size and Parallelism

A size and type for every job

- Purest Quartz
- Accuracies to .000001
- Diameters to 10"
- Special sizes, shapes made to order

Consult your yellow Directory for location of nearest of the thirty-eight DoALL Sales-Service Stores that stock complete metal working necessities

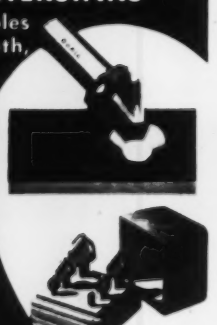
Ask about DoALL Monolights—2" 5", 20" sizes

Call or Write The DoALL Co.
Des Plaines, Ill. 14

DoALL CHATTER FREE COUNTERSINKS

...produce holes with a smooth, valve-seat appearance

New off-center flute design. Shears metal—does not gouge. Provides faster, more accurate cutting. Lasts longer. Available in H. S. Steel.



Call DoALL see classified phone directory for nearest DoALL Service Store—complete stock of gages, cutting tools, supplies

Or Write The DoALL Co.
Des Plaines, Ill. 25

Sets available in 60°, 82°, 90°, 100°, 120°, angles

DoALL Precision Tool and Die Steel (Ground Flat Stock)

Save time, labor, money

- Ready to use for tools, dies, gages, parts
- Parallel, square, precision ground
- Over 230 sizes
- Oil or air hardening

Call DoALL — consult yellow directory for nearest DoALL Service Store that stocks cutting tools, gages, supplies — or Write

The DoALL Co.
Des Plaines, Ill. 6

Ink it! Mark it! Saw it!

Use DoALL Steel Ink

DoALL Demon Defies Dulling

User Reports New High Speed Steel Saw Band Outlasts 4 Carbon Steel Blades and Cuts Sawing Time 91%

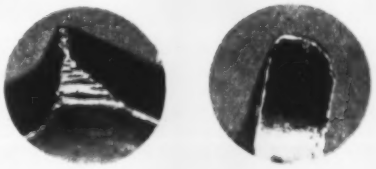
The new high speed steel DoALL DEMON saw bands open up new opportunities for band machining cost reductions. Designed with one thought in mind —get the work out faster, easier, and at a less cost—they are already proving their worth in a wide variety of jobs. When used with the new, heavier duty, power feed DoALL Band Machines, real economies are immediately apparent.

Below is the result of an actual test run by one of the country's leading manufacturers of automobile accessories.

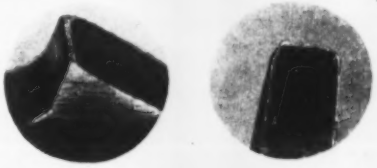
The ability of DoALL DEMON saw bands to maintain their sharpness through tough, tortuous sawing when other blades fail, stems from the fact that these saw bands retain full hardness even with red heat (about 1000° F.) in contrast to carbon steel which begins to lose its hardness at about 400° F.

Shown at the right are two 30X photomicrographs comparing the condition of the set tooth tips of DEMON and carbon steel saw blades after making ten cuts in 3240 tool steel, hardened to 40-42 Rockwell C. In both cases the same feed and blade velocity were used.

DoALL DEMON Saw Bands in Precision and Buttress types are available in cut and welded lengths in the width-pitch combinations shown at the right. Details available on request.



Carbon Steel After 10 Cuts



Demon After 10 Cuts

TYPE	BUTTRESS			PRECISION		
PITCH	2	3	4	6	8	10
1/4"						✓
3/8"						✓
1/2"			✓			✓
3/4"		✓		✓	✓	✓
1"	✓	✓		✓	✓	✓

Comparison DoALL Demon vs Carbon Blade

	DoALL DEMON saw band		Carbon Steel saw bands	
No. of blades used	1.0		4.2	
Cost per blade	$19.73		$2.77	
Total blade cost		$19.73		$11.73
Total sawing time (setup time not included)	1.8 hrs.		20.6 hrs.	
Tool room saw rate	$4.00/hr.		$4.00/hr.	
Total saw time cost		$7.20		$94.13
Total cost for sawing 55½" Timken Alloy (not including setup cost)		$26.93		$105.86

Savings: $78.93 (not including setup time)

DoALL FILES for Every Job

American and Swiss Pattern Hand Files • Rotary Files and Burrs

DoALL Band Files — Fastest Filing for Internal and External Finishing in the World

Call DoALL

see classified directory for Service-Store stocking files, cutting tools, gages, supplies . . .

Or Write: THE DoALL COMPANY DES PLAINES, ILL.

22

For Your Best Buy in a Magnetic Chuck

Call DoALL

MAGNA-LOCK CHUCKS

- For every job, heavy or light
- Rectangular
- Rotary
- Swiveling
- Vertical
- Sine
- Special

Superior holding power

Moisture-proof

Shock-proof

Call DoALL

see classified phone directory for nearest DoALL Service-Store — complete stock of gages, cutting tools, supplies.

Or Write

THE DoALL COMPANY Des Plaines, Ill.

26

MAKE YOUR OWN PRECISION GAGES with DoALL MICRO-STEP GAGING SYSTEM

Save money — Assemble unlimited different gages for shop and lab, using gage blocks and unique new Micro-Step Accessories.

FREE DEMONSTRATION

Consult your yellow Directory for location of nearest of the thirty-eight DoALL Sales-Service Stores that stock complete metal working necessities.

End Standards

Holders

Gage Blocks

Call or Write The DoALL Co. Des Plaines, Ill.

5

For PRODUCTION TAPPING AT ITS BEST

Use DoALL "Engineered" Taps

- Complete stocks
- All kinds . . . all sizes
- High speed steel
- Special taps for special needs

Call DoALL

see classified directory for nearest DoALL Service-Store carrying complete stocks cutting tools, gages, supplies.

Guaranteed None Finer

The DoALL Co. Des Plaines, Ill.

17

HOLLOW-FRAME MICROMETERS Reduce Gaging Errors

Up to 50% less weight

Lessens fatigue, assures accurate gaging, better balance and feel

Minimizes expansion and contraction

Call DoALL

see classified phone directory for nearest of 38 DoALL Service-Stores that stock gages, cutting tools, supplies—

Or Write

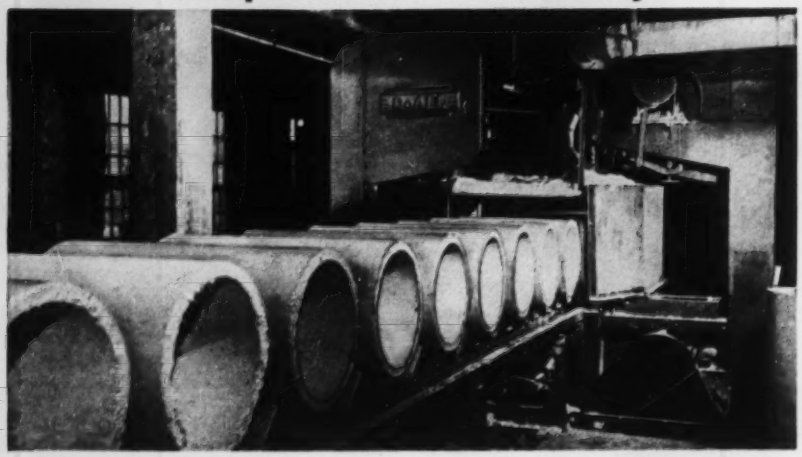
The DoALL Co. Des Plaines, Ill.

23

Sizes up to 96"

----See Next Page--->

DoALL's Trim Pipe Insulation Automatically



At Ehret Magnesia Corporation, Valley Forge, Pa., special DoALL Band Machines slice 85% magnesia insulation material in preparation for stacking and boxing. The photo shows how both ends are trimmed simultaneously. Pieces are then passed on to another DoALL to be cut down the center to form semi-circular lengths.

Free Demonstrations

A "see-before-you-buy" service is offered to customers by all DoALL stores. Any cutting tool, gage, machine tool or supply item will be demonstrated at any plant free of charge upon request. Additionally, DoALL men carry color stereo slides showing applications of DoALL band machines and surface grinders to enable industrial buyers to better visualize use of the equipment. Motion pictures are available for group showings.

Sawing, Gaging Texts

The DoALL Band Tool Manual, a 160 page text explains selection and use of saw bands and other band tools for every purpose. Terminology, diagrams and selection tables included. Price $2.00.

The Science of Precision Measurement, a 264 page text explains the need and application of gage blocks, optical flats and other accessories for millionths-inch accurate quality control. Price $3.50.

You Can Cut Cost Per Hole with DoALL Reamers because:

1. Special processing gives more holes per grind.
2. Faster feeds can be used.
3. DoALL stocks more sizes and types than anyone else — "specials" with others are standard at DoALL.

Call DoALL—see classified directory for nearest DoALL Service-Store. Cutting tools, gages, tool steel, supplies in stock.

Or Write:

The DoALL COMPANY

Des Plaines, Illinois 18

DoALL Granite SURFACE PLATES

Non-Rusting • Non-Magnetic • Utmost Accuracy • Cheaper Than Metal Plates

- Wear Free
- Shock Proof
- Harder than hardened steel
- Velvet Smooth
- Unsurpassed for Production, Inspection and Layout Work

SIZES SHAPES AND ACCURACIES FOR EVERY REQUIREMENT

Consult your yellow Directory for location of nearest of the thirty-eight DoALL Sales-Service Stores that stock complete metal working necessities.

INDIVIDUAL Working Flats only $22.50 Ea.

DoALL

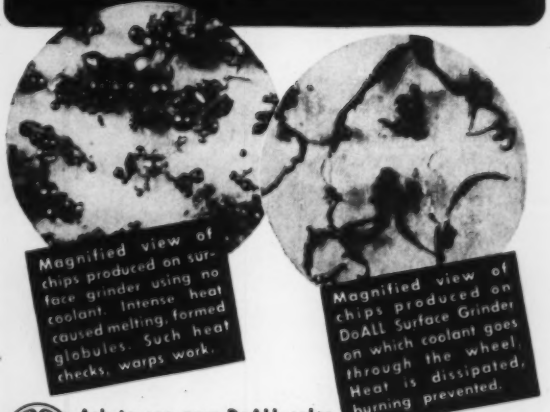
2"x8"x12" .0002" Surface Accuracy

Call Your DoALL Service-Store

Machine Tools • Cutting Tools • Measuring Instruments • Shop Supplies • In Stock

The DoALL Company, Des Plaines, Ill.

DoALL GRINDING RESEARCH Helps You Get Better Results



Magnified view of chips produced on surface grinder using no coolant. Intense heat caused melting, formed globules. Such heat checks, warps work.

Magnified view of chips produced on DoALL Surface Grinder on which coolant goes through the wheel. Heat is dissipated, burning prevented.

Ask to see new DoALL color, sound film "Techniques of Surface Grinding." For showings to groups. Call your DoALL Store.

DoALL

33 The DoALL Company, Des Plaines, Ill.

Vol. 3—No. 2—65M—4-54

PRINTED IN U.S.A.

sine wave power for general lab use and production testing. Amplitude and frequency stability under difficult load and line conditions make the DK-1 an ideal AC power supply for magnetic amplifiers, telemetering, strain gages and precise measurement at simulated line frequencies. Nuclid Corp.

FOR MORE DATA CIRCLE NO. 11 ON REPLY CARD

Soldering Torch

. . . instant trigger control

A pistol-shaped torch, the Torch-O-Matick, for soldering, burning, sweating and other jobs is designed for use with propane gas. A trigger controls a fine, pin-point or a

full, 6-inch flame. Instant-on, instant-off features save time and gas.

Pumping, priming, heating and waiting are eliminated through use of the torch because ignition is instant on squeeze of the trigger. It connects directly to the propane tank without need for intermediate valve apparatus. Velocity-Power Tool Co.

FOR MORE DATA CIRCLE NO. 12 ON REPLY CARD

Metal Weights Calculator

. . . covers four basic metals

Slide calculator instantly computes total weights of any one of the four basic metals in a wide variety of forms and sizes and in lengths ranging from 1 inch to 1000 feet.

The 11½ x 5-inch card provides for weight calculation of copper, yellow brass, stainless steel and aluminum in all standard diameters and thicknesses. It has a factor table for conversion of yellow brass weights into weights for 39 other common copper alloys

and can be used in conjunction with all forms including tube, rod, wire, square or rectangular bar, sheet, strip or plate. Chase Brass & Copper Co.

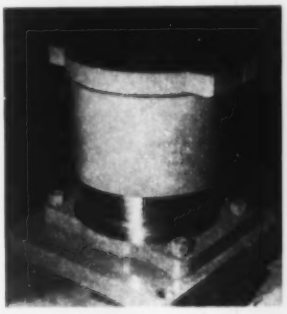
FOR MORE DATA CIRCLE NO. 13 ON REPLY CARD

Pneumatic Die Cushion

. . . with internal guiding

The model H full universal pneumatic die cushion is all steel and is provided with internal guiding means to compensate for off-center loading. The furnished hardened and ground pin pressure pad is custom made to fit details of the press bed opening.

It is also provided with an adjustable stopping means which will arrest the pin pressure pad at any desired position on the up cycle of the pneumatic die cushion. It is now available in sizes of 10-



inch to 24-inch cylinder dimension. Dayton Rogers Mfg. Co.

FOR MORE DATA CIRCLE NO. 14 ON REPLY CARD

Thickness Gage

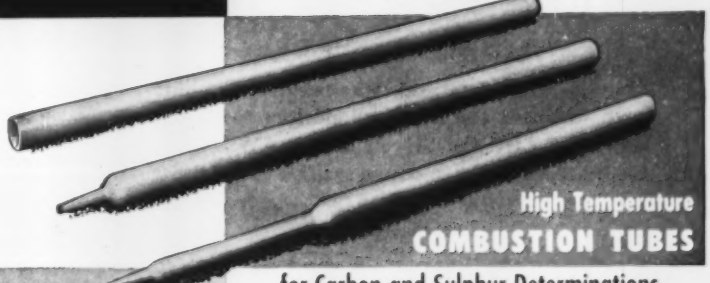
. . . on ferrous metal bases

Elecometer, a pocket-size thickness gage measures nonmagnetic protective and decorative coatings on ferrous metal bases with an accuracy of ±0.0001 inch. It can measure films such as porcelain enamel, plating, paint, foils, plastic sheeting, glass, rubber, etc.

Meter incoporates a locking de-

MORE Determinations per Tube

. . . with Rarely a Failure



for Carbon and Sulphur Determinations

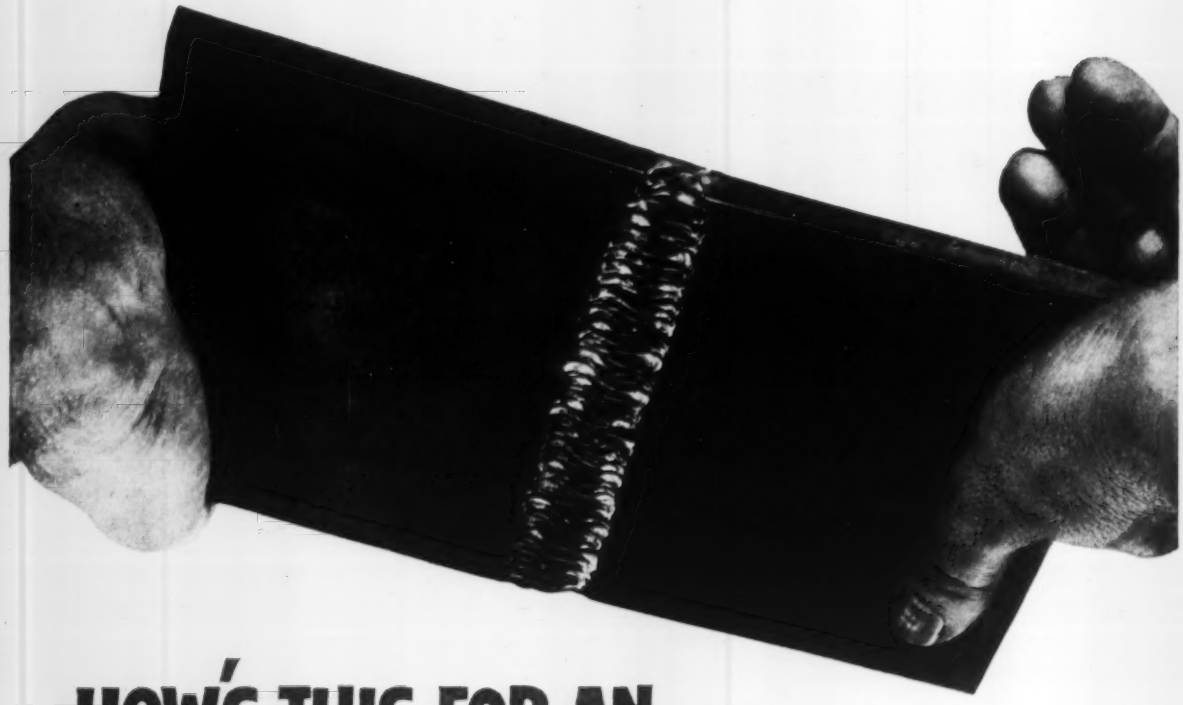
SPECIALTIES

Immediately available are standard porcelain specialties such as retorts, flasks, crucibles, etc. Taking a little longer — but not much — are McDanel Porcelain parts especially developed and designed to meet your specific needs.

McDanel High Temperature Porcelain Combustion Tubes and Zirco Tubes keep laboratory control costs at rock bottom. They are non-spalling, non-blistering and gas-tight. McDanel Tubes are precision made in every detail and their specially-developed refractory body gives them top resistance to thermal shock. Always specify McDanel Tubes from your supplier or Dealer.

Write Today for Catalog *"McDanel Industrial Porcelains"*

McDANEL REFRACTORY PORCELAIN CO.
BEAVER FALLS, PENNA.



HOW'S THIS FOR AN OVERHEAD WELD?

. . . You can make mild steel welds like this in <u>any</u> position

with the improved AIRCO® 78E *electrode*

Above is an unretouched photograph of a butt weld made in the overhead position with the improved AIRCO 78E electrode, AWS Class E-6010. The joined sections are 3/8" SAE 1020 steel plate, welded with 5/32" electrodes at 130 amperes, D C reversed polarity.

A smooth-looking weld, yes, but appearance is only part of the story with the AIRCO 78E electrode.

Field testing in all welding categories covered by AWS Class E-6010 specifications has shown that the improved 78E consistently outperforms other electrodes of its type in weld quality, speed and ease of handling.

The 78E's improved flux coat gives you higher current capacity and faster burn-off rate . . . without "fingernailing" or slag and gas inclusions in the weld metal. Result: in all positions, weld quality is every bit as good as its smooth outward appearance would lead you to hope.

If you haven't yet had a chance to give the new AIRCO 78E a trial, get in touch with your Airco office or dealer today. Here's another suggestion: — ask for a copy of Catalog 10, "Pocket Guide to Airco Electrodes."

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Incorporated with offices and dealers in most principal cities

Air Reduction Sales Company
Air Reduction Magnolia Company
Air Reduction Pacific Company
Internationally by Airco Company International

at the frontiers of progress you'll find

AN AIR REDUCTION PRODUCT

vice, permitting accurate reading of scale after measuring an inaccessible area where scale cannot be

seen. It does not depend on an outside power source. Contact spheres are finished in chrome plating to withstand hard wear. Ferro Corp.

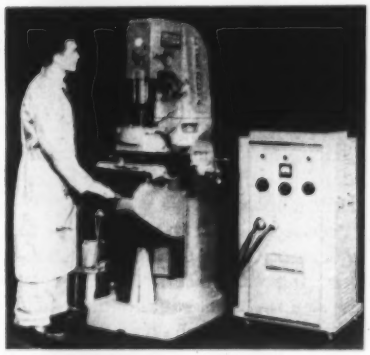
FOR MORE DATA CIRCLE NO. 15 ON REPLY CARD

Ultrasonic Machine

. . . for unmachinables

The Trail Blazer model Sheffield Cavitron ultrasonic high precision machine tool has the ability to machine so-called un-machinable materials and possesses all the elements required for extreme accuracy, versatility and simplicity of operation.

It can produce holes as small as 0.012-inch diameter or slots that



width, in the hardest materials at high speed and at low cost. It will sink blind, through, tapered or curved holes of almost any desired shape and depth; cut keyway and oil holes; machine serrated root forms of jet turbine blades. Sheffield Corp.

FOR MORE DATA CIRCLE NO. 16 ON REPLY CARD

Metal Fastener

. . . for one shot application

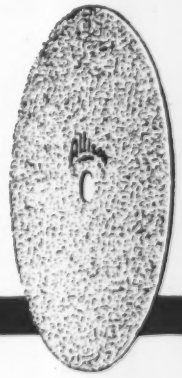
Speed Stud metal fastener is one piece for one shot application. End that is inserted into the hole

No need to hold back any longer...

Adequate Titanium Supply Assured by Aircraft Production Resources Agency
January, 1954, Bulletin:
"It is evident that there will be more assurance of an adequate supply to meet most planned production programs in 1954."

Titanium
IS RARIN' TO GO!

. . . and the cutting of Titanium is no longer a problem, either. Allison abrasive cutting wheels can speed your company on its way to finding new uses for this wonder metal. Tests prove that abrasive cutting is *the only efficient and economical method* for cutting Titanium, as well as many of the tough "new" high-temperature resistant alloys.



The cutting of Titanium with Allison abrasive wheels is comparable in speed, quality and economy with that of cutting most grades of steel.

Tough Cut-Off Jobs Are Easy . . . with Allison.

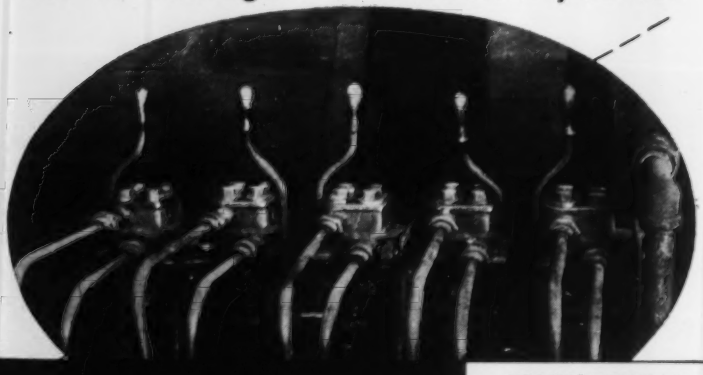
2ALS4

The *best* way to cut many materials . . . the *only* way to cut some.

Allison ABRASIVE CUTTING WHEELS

THE ALLISON CO., 255 ISLAND BROOK AVENUE, BRIDGEPORT 8, CONN.

You'll have fewer shutdowns due to damaged valve seats if you use



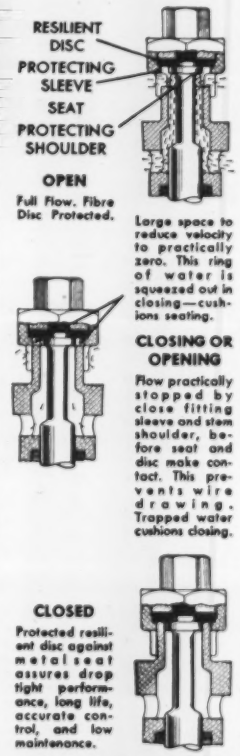
HOMESTEAD
Protected Seat
HYDRAULIC OPERATING VALVES

They give Longer, Low Cost Service

Production stoppages, due to damaged seating elements, are practically eliminated by the exclusive "Protected-Seat" built into every Homestead Hydraulic Operating Valve.

Protection against "wire drawing" or "cutting" of the seat is provided by a closely fitted protecting sleeve and stem shoulder which surround the metal seat and resilient disc in such a way that fluid-flow is all but shut off while the seat face and disc are still widely separated. With velocity thus reduced to almost zero, the most frequent causes of leakage and resultant shutdowns are eliminated. Grit, or other foreign material in the line is usually absorbed by the disc without damage to the valve seat. Records of 18 months continuous maintenance-free service are common.

HERE'S HOW THE PROTECTED SEAT *WORKS*


RESILIENT DISC
PROTECTING SLEEVE
SEAT
PROTECTING SHOULDER
OPEN
Full Flow. Fibre Disc Protected.
Large space to reduce velocity to practically zero. This ring of water is squeezed out in closing—cushions seating.
CLOSING OR OPENING
Flow practically stopped by close fitting sleeve and stem shoulder, before seat and disc make contact. This prevents wire drawing. Trapped water cushions closing.
CLOSED
Protected resilient disc against metal seat assures drop tight performance, long life, accurate control, and low maintenance.

HOMESTEAD VALVE MANUFACTURING COMPANY
"Serving Since 1892"

MAIL THIS COUPON TODAY!
WE'LL SEND YOU FULL PARTICULARS BY RETURN MAIL

HOMESTEAD VALVE MANUFACTURING CO.
P. O. BOX No. 22, Coraopolis, Pa.

Please send me without obligation, VALVE REFERENCE BOOK No. 39 and complete data on HYDRAULIC OPERATING VALVES.

NAME.....TITLE.....
COMPANY.....
ADDRESS.....
CITY.....STATE.....

NEW PRODUCTS and equipment

has two fingers of spring steel 90 degrees apart. As the stud is inserted, spring fingers compress until head is seated, then snap open into their original position. Thus, tension is brought to bear against inner and outer surfaces by fingers and head of stud.

Spring action punch with addition of a speical magnetized head may be used for application. Pneumatic tools also can be adapted. Speed Stud Corp.

FOR MORE DATA CIRCLE NO. 17 ON REPLY CARD

Dial Indicators

. . . 140 models in line

Dial Indicators, by L. S. Starrett, are designed featuring simplified construction with high ef-

ficiency, low friction for greater accuracy, longer life and less maintenance.

Precision built throughout to American Gage Design specifications, the line offers 140 models. The line includes regular and non-shock types, with balanced or continuous dials, jeweled or plain (inserted bronze) bearings, English or metric graduations in all four standard A.G.D. groups plus a complete series of long range models. L. S. Starrett Co.

FOR MORE DATA CIRCLE NO. 18 ON REPLY CARD

Sharpening Machine

. . . does precision sharpening

The No. 6-5 Hydraulic Hob Sharpening Machine is designed for production sharpening of high-speed steel and carbide-tipped hobs and form-relieved cutters. It is a precision machine providing

For Better Quality

Your product parts will perform better — and gain in value — when a product-improving finish is added in Norton's new Job Lapping Department

An enlarged job lapping service

Now you can improve your product quality with precision lapped parts!

The new Norton Job Lapping Service is ready to help you improve product quality and performance — by furnishing parts to your exact specifications.

Complete and modern in every detail, the new department is manned by expert personnel, operating Norton machines for every type of lapping. Results are checked on the latest electrical and optical inspection equipment, while precision accuracy is further assured by careful atmosphere control. The scope of jobs that can be handled is broad, covering:

Materials — Practically unlimited in range, including hardened steel, stainless steels, stellite facings, cast iron, nonferrous pressed and die-cast parts.

Types of Lapping — Single and parallel face flat lapping, to specifications ranging from stock removal to optical flatness. Also, external cylindrical lapping to high precision requirements.

Workpiece Capacities — Flat work up to 24″ across. Cylindrical work from 1/16″ diameter by 1/2″ long to 2″ diameter by 8″ long.

Meeting Your Needs Exactly — The entire project is under direct supervision of Norton Lapping Engineers, pioneers in the development of mechanical lapping processes and machines. They are prepared to work out the best lapping techniques for your requirements. For full details, see your Norton Representative or write us direct. NORTON COMPANY, Machine Division, Worcester 6, Mass.

***To Economize, Modernize With* NEW**

NORTON

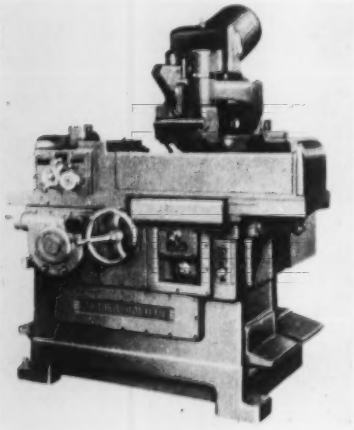
GRINDERS and LAPPERS

Making better products... to make other products better

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit • *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5

accurate controls over flute spacing, rake angle, load of gash and surface finish.

The machine handles a variety of tools with straight or helical flutes, shell or shank type, up to 6 inches in diameter by 5 inches face width. It is equipped for wet grinding for maximum production. With the use of a diamond wheel, it can provide a production method for sharpening carbide-tipped hobs and form-relieved cutters. By using automatic controls the machine will continue on a set operation. Table



speed is adjustable and a central pushbutton panel provides fingertip control over machine elements. Barber-Colman Co.

FOR MORE DATA CIRCLE NO. 19 ON REPLY CARD

Metal Splicer

. . . for continuous feeding

Manufacturing rights to the Weld-a-Matic splicer have been acquired by E. W. Bliss' Rolling Mill Division from the defunct Arms-Franklin Corp.

The Weld-a-Matic splices ferrous and noferrous strip required for coil buildup, continuous feeding of skelp in light-walled pipe manufacture, reuniting silicon sheets into continuous strands and coils, etc. Principle involved permits shielded arc butt welding of low, medium and high-carbon steel strip, stainless strip, copper and copper-base alloys. Aluminum splicing has already been perfected in some grades. Operation is entirely automatic. E. W. Bliss Co.

FOR MORE DATA CIRCLE NO. 20 ON REPLY CARD

FREE LITERATURE

Catalogs and Clip Sheets

Reply card on page 173 will bring you free literature, editorial clips or more information on new products and equipment described or advertised in this issue

Roofing, Siding Material

Toledo Porcelain Enamel Products Co.—An 8-page brochure describes the use of V-Corr, and enamel-on-steel roofing and siding material. Illustrated brochure describes advantages, composition, colors and methods of installing V-Corr.

FOR MORE DATA CIRCLE NO. 21 ON REPLY CARD

High Quality Finishes

DeVilbiss Co.—High quality finishes at minimum cost with less fatigue is the theme of the booklet, "Spray Gun Motion Study." It includes a description of procedures in spraying various surfaces which are encountered in production spraying operations. Continuity of motion and its importance are discussed in the bulletin.

FOR MORE DATA CIRCLE NO. 22 ON REPLY CARD

Titanium Tubing

Superior Tube Co.—Properties, applications and advantages of titanium tubing are presented completely in bulletin No. 42. Some of the research and development which went into the product is outlined, together with properties of titanium that make it a promising material for many new applications. Tube sizes of seamless titanium and Weldrawn titanium are listed.

FOR MORE DATA CIRCLE NO. 23 ON REPLY CARD

Revised Catalog

Firth-Sterling Inc. — A 48-page catalog encompasses the distributor line of steel and Firthite carbide products. Price adjustments as well as additional specifications are reflected in the new catalog.

FOR MORE DATA CIRCLE NO. 24 ON REPLY CARD

Cast Stainless Steels Chart

Empire Steel Castings Inc.—A designation chart for cast stainless steels has been prepared by Empire Steel Castings. It designates specifications, analysis, physical properties and uses of a number of corrosion and heat-resistant stainless steels. It correlates the AISI type number and ASTM and SAE designations with Empire Steel and ACI designations, so users can readily identify properties of their castings.

FOR MORE DATA CIRCLE NO. 25 ON REPLY CARD

Floor Trucks, Casters

Hamilton Caster & Mfg. Co. — Hamilton offers two brochures covering their floor trucks and casters. Brochure describing floor trucks is illustrated and specifications are given for each type described. Various types of casters available are described and dimensions included for each type described.

FOR MORE DATA CIRCLE NO. 26 ON REPLY CARD

Jack Manual

Duff-Norton Mfg. Co.—This company offers a 40-page illustrated manual explaining how to choose the right jack for the job. It lists types of ratchet, screw and hydraulic jacks, from 3 to 100-ton capacities, and gives complete specifications for each jack. Safety hints in the use of jacks are included.

FOR MORE DATA CIRCLE NO. 27 ON REPLY CARD

Arc Spot Welders

Miller Electric Mfg. Co.—Miller's complete line of welders is covered in an illustrated brochure. Current range and specifications are included for each type. Price lists accompany each description.

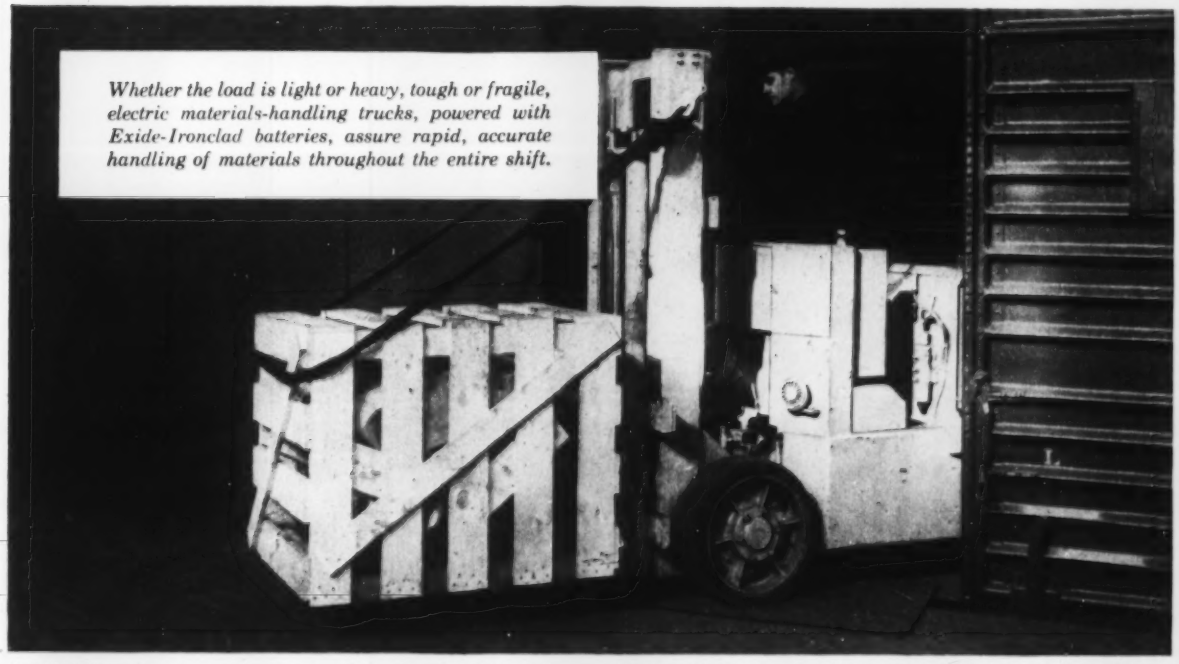
FOR MORE DATA CIRCLE NO. 28 ON REPLY CARD

Welding Elbows

Taylor Forge & Pipe Works—ASME paper 53-A-70, "In-Plane

GET FULL SHIFT HANDLING, NO UNSCHEDULED DOWN TIME

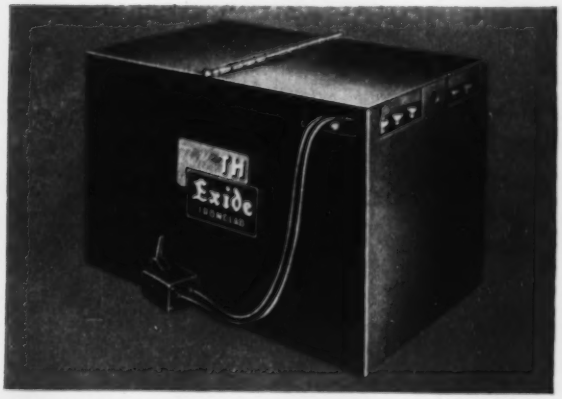
. . . with low cost Exide-Ironclad power!



Whether the load is light or heavy, tough or fragile, electric materials-handling trucks, powered with Exide-Ironclad batteries, assure rapid, accurate handling of materials throughout the entire shift.

YOU GET uniform performance throughout each shift when battery electric trucks are powered by Exide-Ironclads. Your trucks handle as much load during the last hour as during the first . . . with no unscheduled down time. Lower costs for operation, maintenance and depreciation make Exide-Ironclads your best power buy—AT ANY PRICE!

THE POSITIVE PLATES are the heart of any battery. Only Exide uses a slotted tube construction. By use of tubes, more active material is exposed to the electrolyte, providing *greater power*. Also, more active material is retained, giving *longer working life*.



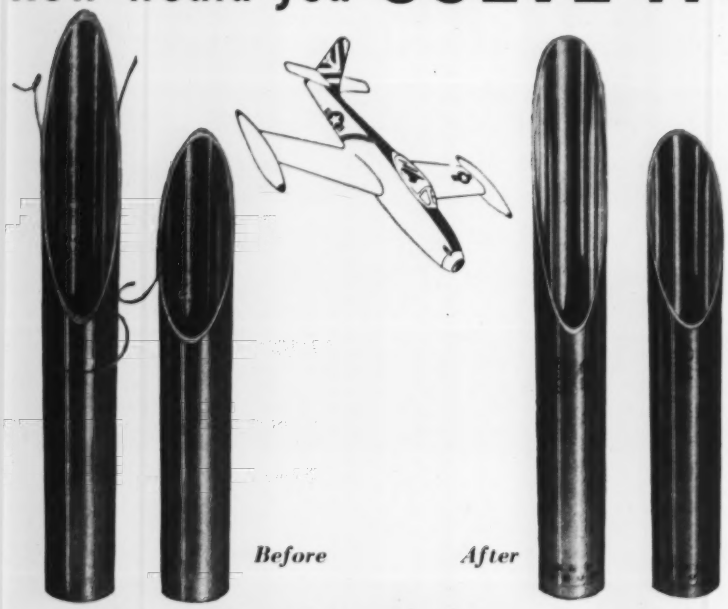
THE NEW THRIFTY HAULER! The improved industrial truck battery. *Non-oxidizing* plastic power tubes assure longest battery life, more capacity in the same space. For full details, call your Exide sales engineer—write for Form 1982 (Installation and Maintenance of Motive Power).

Your best power buy . . . AT ANY PRICE!

Exide®
IRONCLAD® BATTERIES

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa. • *Exide Batteries of Canada, Limited, Toronto*

How would you SOLVE IT?



1 PRODUCTION PROBLEM:

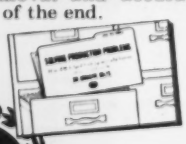
To speed production and cut unit costs of grinding rough-sawed ends of stainless steel blast tube receivers for jet aircraft, Christensen Tool & Engineering Co., had to knock off the razor-sharp burrs caused by sawing, and also grind the end to the tube contour.

2 SOLUTION:

A 3M Representative suggested that this Norwalk, Connecticut, manufacturer switch to the 3M Method, using "Wetordry" Three-M-ite Cloth belts, running wet over a platen sander. This method met the firm's need for rapid stock removal and accurate, smooth shaping of the end.

3 RESULTS:

An immediate production increase of 300%—from 25 to 100 pieces per hour. And the company found they could finish between 300 and 400 pieces with one belt! A 3M Representative can help you solve your grinding problems, too. His services are available without cost or obligation.



3M ABRASIVES

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: London, Ont., Can. Export: 122 E. 42nd St., New York City. Makers of "Scotch" Pressure-Sensitive Tapes, "Scotch" Sound Recording Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

WANT MORE INFORMATION?

MINNESOTA MINING AND MFG. CO.
Dept. S-54, St. Paul 6, Minn.

☐ Send me free booklet describing actual 3M Abrasive belt installations.
☐ Have 3M Representative call.

*Name*_____ *Title*_____

*Company*_____

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Bending Properties of Welding Elbows" presents results of strain gage investigations conducted on relatively heavy wall welding elbows having a ratio of bend radius to nominal pipe size of 1½ : 1. Purpose of the paper is to fill a gap in practical design information available for a class of fittings having wide industrial use.

FOR MORE DATA CIRCLE NO. 29 ON REPLY CARD

Carboloy Metals

General Electric Co.—Carboloy Department offers a brochure, "Changing the Shape of the Future with Carboloy Created-Metals." It tells the story of the creation of the created-metal, its place and importance in the past, in the present and in the future.

FOR MORE DATA CIRCLE NO. 30 ON REPLY CARD

Double-Crank Presses

E. W. Bliss Co.—A 16-page brochure contains recommendations for modernization and conversion of straight-side and gap-frame double-crank presses. It gives 18 examples of the 42 conversion assemblies developed by Bliss to revitalize obsolete or worn out presses.

FOR MORE DATA CIRCLE NO. 31 ON REPLY CARD

Turbine Booklet

Westinghouse Electric Corp. — The company's 20-page booklet on type E turbines has been re-issued. Covering the complete line in ratings through 1500 hp, this booklet describes design and constructional characteristics, as well as accessories, which make these units adaptable to special requirements. Application, specification and selection data are provided.

FOR MORE DATA CIRCLE NO. 32 ON REPLY CARD

Silastic Selection

Dow Corning Corp.—To help the user select the Silastic best suited to his needs, Dow Corning has compiled a reference guide to 30 of the most popular stocks and pastes. Identified as Silastic Facts 9-334, it briefly describes each raw stock; giving its leading characteristics, useful temperature range, suggested applications; recommended fabrication methods.

FOR MORE DATA CIRCLE NO. 33 ON REPLY CARD

Weld Removal

Minnesota Mining & Mfg. Co.— "Weld Grinding and Blending with

USE A CARD

FREE CATALOGS and LITERATURE

NEW PRODUCT INFORMATION

INFORMATION ON ADVERTISED PRODUCTS

FREE EDITORIAL CLIP SHEETS

3M Abrasives" is the title of an 8-page booklet describing use of coated abrasive discs and belts for weld removal. It gives detailed information on how users of coated abrasives find unit costs are reduced, production increased and quality of finish improved. Specialty items for weld grinding are also shown.

FOR MORE DATA CIRCLE NO. 34 ON REPLY CARD

Box Stitcher Maintenance

Acme Steel Co. — A chart explaining and illustrating maintenance procedures for box stitching machines has been developed by Acme Steel. It shows operators and maintenance men how to keep machines properly adjusted and track down causes of faulty stitches. A perfect stitch is pictured on the face of the chart, and the five adjustments necessary to secure it are described.

FOR MORE DATA CIRCLE NO. 35 ON REPLY CARD

Rolling Doors

Kinnear Mfg. Co.—This booklet gives helpful information in not only comparing the advantages of the different styles of upward-acting types of doors, but also dimensional information necessary in planning the use of such doors. Specifications, schematic drawings and photographs are included.

FOR MORE DATA CIRCLE NO. 36 ON REPLY CARD

Recording Controllers

General Electric Co.—New line of process instruments including potentiometric and ac bridge recorders and recording controllers is described in a comprehensive catalog prepared by the Meter & Instrument Division. The catalog is profusely illustrated and includes specifications and controls and additional features available with both ac and dc instruments.

FOR MORE DATA CIRCLE NO. 37 ON REPLY CARD

Motorpump Selection

Ingersoll-Rand Co.—A booklet is offered by Ingersoll-Rand which gives a brief description of what a centrifugal pump is and how it works. It points out various factors, such as quantity, pressure, friction losses and head that must be considered in selecting a pump to meet a specific installation.

FOR MORE DATA CIRCLE NO. 38 ON REPLY CARD

Multi-Clean Florule

Multi-Clean Products Inc.—A 4 x 6-inch cardboard reference device is a ready source of information on how to treat various types of floors. The Florule features a rotating dial, which, when pointed to the name of a certain floor, discloses the proper floor materials to use, coverage in square feet per gallon for each, drying times, and method of application.

FOR MORE DATA CIRCLE NO. 39 ON REPLY CARD

Abrasive Savings

American Wheelabrator & Equipment Corp.—"Six Steps to Greater Abrasive Savings" is the title of a 4-page brochure published by American Wheelabrator. Performance data, plus a check list to assure consistent quality, are included.

FOR MORE DATA CIRCLE NO. 40 ON REPLY CARD

Platers' Equipment

Udylite Corp.—A 24-page general catalog pictures and describes a complete line of platers' equipment. Fully automatic plating machines included are: Return types, straight lines, rotaries and juniors. Barrel plating equipment and ac-

For free literature, editorial clips or more information on products described in this section, circle the corresponding number at left. Fill in box below for articles or advertisements not numbered.

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5-10-54

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Penton Building
Cleveland 13, Ohio

Readers Service Dept.

cessories are included as well as electrical equipment, filters, dryers and a listing of processes and supplies.

FOR MORE DATA CIRCLE NO. 41 ON REPLY CARD

Motor Control

Rowan Controller Co.—Rowan offers an attractive 20-page booklet that describes its line of industrial electric motor controls. The booklet is intended as an introduction of their line of motor control equipment, not as complete coverage. Bulletins and price sheets giving details are available.

FOR MORE DATA CIRCLE NO. 42 ON REPLY CARD

Rubber Hose Bulletin

H. K. Porter Co. Inc.—A specific hose for each type of spraying job is described in this bulletin. Water hoses, paint spray hoses are included. All are pictured in cutaway and cross-section photos. Descriptive data includes construction, sizes, weights, working pressures and recommended uses of the hoses. Types of couplings also are specified.

FOR MORE DATA CIRCLE NO. 43 ON REPLY CARD

Tubing and Pipe

Wallingford Steel Co. — An 8-page booklet describes their line of welded ornamental, mechanical or pressure, sanitary and aircraft tubing and pipe. A brief description of the mill and a picture story on how the tube takes shape are given. Tubing production limits and pipe sizes are included in chart form.

FOR MORE DATA CIRCLE NO. 44 ON REPLY CARD

Composite Catalog

Minneapolis-Honeywell Regulator Co.—Catalog No. 5001, Honeywell's revised composite catalog, has added many new features. Containing brief descriptions of all Brown instruments, the new catalog gives comprehensive coverage of the products of Honeywell's Industrial Division.

FOR MORE DATA CIRCLE NO. 45 ON REPLY CARD

Air, Hydraulic Maintenance

Logansport Machine Co.—Publication of a pocket-sized manual, "The ABC's On Maintenance of Air and Hydraulic Equipment," is announced by Logansport. Booklet deals with its subject in cartoon style. Its intent is to bring to the reader, in a practical explanation, the rights and wrongs in setting up and servicing air and hydraulic equipment.

FOR MORE DATA CIRCLE NO. 46 ON REPLY CARD

Surface Grinder

Thompson Grinder Co.—Catalog F53 describes, in considerable detail, their Type F surface grinder. Diagram of controls, clearance diagram, floor plan, standard wheel shapes and specifications are included.

FOR MORE DATA CIRCLE NO. 47 ON REPLY CARD

EDITORIAL REPRINTS:

Alloy Development

It's not difficult to see why industry leans heavily on light metals when you read what the major suppliers are doing in alloy development and improvement. Appearing on page 118, this forum of five of these suppliers shows that they are keeping one eye on industry's needs today while working up better materials for tomorrow.

FOR MORE DATA CIRCLE NO. 48 ON REPLY CARD

Reaction to Freight Cuts

Railroads are reclaiming on the basis of new rail rates some steel traffic that formerly had gone by truck. But truckers are countering with speedier service, some price concessions. Low inventories at manufacturers' level hold back shift to rail shipments.

FOR MORE DATA CIRCLE NO. 49 ON REPLY CARD

Alloy Steels

The case for alloy versus carbon steel is presented on page 114. Alloys are expensive, but they must be used when a needed property can't be obtained economically with carbon steel. They defeat a variety of destructive forces at work in machinery and equipment.

FOR MORE DATA CIRCLE NO. 50 ON REPLY CARD

Metal Selector

STEEL offers extra copies of the 8-page metal selector appearing as an insert in this issue. The selector brings up to date the specifications on H-steels and leaner alloys, stainless steels, copper-base alloys and titanium.

FOR MORE DATA CIRCLE NO. 51 ON REPLY CARD

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FLAT ROLLED AND BAR AND TUBE STOCKS AND PROCESSING SERVICES FROM 11 PLANTS

STEEL

May 10, 1954

Market Outlook

A TIME-TESTED barometer of steel activity still suggests an upturn in steelmaking. That barometer is scrap prices.

In the week ended May 6, they rose enough to push STEEL's price composite on steelmaking scrap up $1.33 over the preceding week. This rise made the composite $27.33 a gross ton, highest level attained since mid-February.

PROPHETIC—The current slow pace in the steel industry was heralded in the first half of last year when scrap prices began wobbling while steel ingots were being turned out at a capacity pace in response to what seemed to be an insatiable demand. In the second half of the year, ingot production began dropping off in line with a reduced demand.

Since mid-March of this year, the price composite on steelmaking scrap has been trending upward, yet the rate of ingot production has been fluctuating within a narrow range, showing no positive inclination to decline or rise sharply.

SLOWER—In one of those narrow fluctuations, the rate of ingot output edged down 2 points to 67 per cent of capacity in the week ended May 9.

Another hopeful sign is the improvement in demand for alloy steels. At Massillon, O., where Republic Steel Corp. makes alloy steels, that company put a fourth open-hearth furnace back into operation. That plant, which has nine open hearths, was closed from Mar. 27 to Apr. 23. Demand for alloy steel went soft early last year.

BACK TO WORK—Granite City Steel Co., Granite City, Ill., called back 260 employees who were laid off earlier this year, and an additional 400 employees who have been working four days a week were put back on a five-day week.

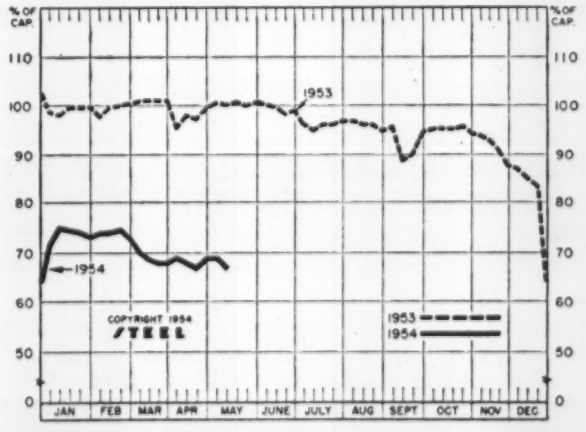
MEASURING CONSUMPTION—The drop in steel production from the high levels of early last year is attributed partly to the move by metalworking plants to reduce their steel inventories after they became confident they could get prompt deliveries. Inventory reduction is not completed. Avery C. Adams, president, Pittsburgh Steel Co., opines that steel consumption is 8 per cent above steel production. If steel production were up in line with current consumption, the ingot production rate would be 72 to 74 per cent of capacity.

HOW THEY'RE BETTING—Approaching labor negotiations in the steel industry are not exciting steel users into laying in stocks as protection against a strike. Most consumers still regard odds as against a steelworkers' strike this summer.

One of the strongest areas of demand in the steel business is in structural shapes. This stems from well diversified and widespread construction activity. Because of this strength in demand, there is little or no absorption of freight charges by sellers of structurals. On various other forms of steel, absorption is common.

IMPORTED COMPETITION—Not only do domestic steel producers feel competition from one another but in some cases they feel the sting of foreign competition. On the West Coast, French-made pipe ranging from ½ to 2 inches in diameter and pipe of ½ to 3 inches from Australia are being offered at prices 9 to 20 per cent below those of U. S. producers.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of capacity engaged)

	Week Ended May 9	Change	Same Week 1953	Same Week 1952
Pittsburgh	67	— 3.5*	93	82.5
Chicago	76.5	— 1.5*	106.5	83
Mid-Atlantic	56	0	97.5	86
Youngstown	68	— 2	106	70
Wheeling	83.5	— 2.5	101	91
Cleveland	75.5	— 2.5*	101.5	87
Buffalo	67.5	0	106.5	104
Birmingham	56.5	0	102	50
New England	55	— 5	92	55
Cincinnati	61.5	+ 1	97.5	90
St. Louis	72.5	0	92	78
Detroit	63	+ 2.5	108	82
Western	72	—12	109	92.5
National Rate	67	— 2	100	83

INGOT PRODUCTION‡

	Week Ended May 9	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	99.9†	101.9	101	140.6
NET TONS (In thousands)	1,604†	1,637	1,622	2,259

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,384,549 in 1954; 2,254,459 in 1953; 2,077,040 in 1952.

PRICE INDEXES AND COMPOSITES

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics) Week Ended May 4)

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, standard, No. 1	$4.400	Bars, H.R., alloy	$8.575	Strip, C.R., stainless, 430 (lb)	$0.415	Tin plate, hot-dipped, 1.25 lb	$8.433
Rails, light, 40 lb	5.767	Bars, H.R., stainless, 303 (lb)	0.418	Strip, H.R., carbon	4.963	Tin plate, electrolytic, 0.25 lb	7.133
Tie Plates	5.125	Bars, H.R., carbon	4.873	Pipe, black, buttweld (100 ft)	14.454	Black plate, can making quality	6.233
Axles, railway	7.250	Bars, reinforcing	4.900	Pipe, galv., buttweld (100 ft)	17.731	Wire, drawn, carbon	7.713
Wheels, freight car, 33 in. (per wheel)	47.000	Bars, C.F., carbon	7.960	Pipe, line (100 ft)	141.960	Wire, drawn, stainless, 430 (lb)	0.545
Plates, carbon	4.550	Bars, C.F., alloy	10.975	Casing, oil well, carbon (100 ft)	149.516	Bale ties (bundle)	5.853
Structural Shapes	4.367	Bars, C.F., stainless, 302 (lb)	0.433	Casing, oil well, alloy (100 ft)	214.113	Nails, wire, 8d common	7.488
Bars, tool steel, carbon (lb)	0.415	Sheets, H.R., carbon	4.755	Tubes, boiler (100 ft)	‡	Wire, barbed (80-rod spool)	6.847
Bars, tool steel, alloy, oil hardening die (lb)	0.505	Sheets, C.R., carbon	5.696	Tubing, mechanical, carbon (100 ft)	‡	Woven wire fence (20-rod roll)	16.174
Bars, tool steel, H.R., alloy, high speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.075	Sheets, galvanized	6.895	Tubing, mechanical, stainless, 304 (100 ft)	161.193	‡ Not available.	
Bars, tool steel, H.R., alloy, high speed W 18, Cr 4, V 1 (lb)	1.550	Sheets, C.R., stainless, 302 (lb)	0.548				
		Sheets, electrical	9.000				
		Strip, C.R., carbon	7.236				

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	May 4 1954	Apr. 27 1954	Month Ago	Apr. Average
(1947-1949=100)	140.8	140.8	140.9	140.9

STEEL's FINISHED STEEL PRICE INDEX*

	May 6 1954	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	189.74	189.74	189.74	181.31	154.01
Index in cents per lb	5.140	5.140	5.140	4.913	4.173

STEEL's ARITHMETICAL PRICE COMPOSITES

	May 6 1954	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Finished Steel, NT*	$113.70	$113.70	$113.70	$110.98	$93.55
No. 2 Fdry, Pig Iron, GT	56.54	56.54	56.54	55.04	46.07
Basic Pig Iron, GT	56.04	56.04	56.04	54.66	45.60
Malleable Pig Iron, GT	57.27	57.27	57.27	55.77	47.27
Steelmaking Scrap, GT	27.33	26.00	25.33	39.67	23.25

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

COMPARISON OF PRICES

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	May 6 1954	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.15	4.15	4.15	3.95	3.35
Bars, H.R., Chicago	4.15	4.15	4.15	3.95	3.35
Bars, H.R., del. Philadelphia	4.405	4.405	4.405	4.502	3.816
Bars, C.F., Pittsburgh	5.20	5.20	5.20	4.925	3.95
Shapes, Std., Pittsburgh	4.10	4.10	4.10	3.85	3.25
Shapes, Std., Chicago	4.10	4.10	4.10	3.85	3.25
Shapes, del., Philadelphia	4.38	4.38	4.38	4.13	3.492
Plates, Pittsburgh	4.10	4.10	4.10	3.90	3.40
Plates, Chicago	4.10	4.10	4.10	3.90	3.40
Plates, Coatesville, Pa.	4.10	4.10	4.10	4.35	3.50
Plates, Sparrows Point, Md.	4.10	4.10	4.10	3.90	3.45
Plates, Claymont, Del.	4.10	4.10	4.10	4.35	3.65
Sheets, H.R., Pittsburgh	3.925	3.925	3.925	3.775	3.25
Sheets, H.R., Chicago	3.925	3.925	3.925	3.775	3.25
Sheets, C.R., Pittsburgh	4.775	4.775	4.775	4.575	4.00
Sheets, C.R., Chicago	4.775	4.775	4.775	4.575	4.00
Sheets, C.R., Detroit	4.975	4.975	4.975	4.775	4.20
Sheets, Galv., Pittsburgh	5.275	5.275	5.275	5.075	4.40
Strip, H.R., Pitts.	4.425	4.425	4.425	3.975-4.225	3.275
Strip, H.R., Chicago	3.925	3.925	3.925	3.725	3.25
Strip, C.R., Pittsburgh	5.45	5.45	5.45	5.10-5.80	4.375
Strip, C.R., Chicago	5.70	5.70	5.70	5.35	4.00
Strip, C.R., Detroit	5.65	5.65	5.65	5.30-6.05	4.20
Wire, Basic, Pitts.	5.525	5.525	5.525	5.225-5.475	4.15
Nails, Wire, Pittsburgh	6.55	6.55	6.55	6.35	5.15
Tin plate (1.50 lb), box, Pitts.	$8.95	$8.95	$8.95	$8.95	$7.75
SEMIFINISHED STEEL					
Billets, forging, Pitts (NT)	$75.50	$75.50	$75.50	$70.50	$61.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	4.525	4.525	4.525	4.425	3.775

PIG IRON, Gross Ton	May 6 1954	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bessemer, Pitts.	$57.00	$57.00	$57.00	$55.50	$47.00
Basic, Valley	56.00	56.00	56.00	54.50	46.00
Basic, deld. Phila.	59.66	59.66	59.66	59.25	49.39
No. 2 Fdry, Pitts.	56.50	56.50	56.50	55.00	46.50
No. 2 Fdry, Chicago	56.50	56.50	56.50	55.00	46.25
No. 2 Fdry, Valley	56.50	56.50	56.50	55.00	46.50
No. 2 Fdry, del. Phila.	60.16	60.16	60.16	59.75	49.89
No. 2 Fdry, Birm.	52.88	52.88	52.88	51.38	41.38
No. 2 Fdry (Birm.) del. Cin.	60.43	60.43	60.43	58.93	47.43
Malleable, Valley	56.50	56.50	56.50	55.00	46.50
Malleable, Chicago	56.50	56.50	56.50	55.00	46.50
Ferromanganese, Duquesne	200.00†	200.00†	200.00†	228.00*	175.00*

*75-82% Mn, gross ton, Etna, Pa. †74-76% Mn, net ton.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pitts.	$28.50	$26.50	$26.50	$39.75	$24.00
No. 1 Heavy Melt, E. Pa.	23.00	22.00	22.00	42.00	22.75
No. 1 Heavy Melt, Chicago	30.50	29.50	27.50	37.50	23.00
No. 1 Heavy Melt, Valley	29.50	28.50	24.50	47.50	22.00
No. 1 Heavy Melt, Cleve.	26.50	25.50	21.50	39.00	18.50
No. 1 Heavy Melt, Buffalo	25.50	25.50	23.50	41.75	23.50
Rails, Rerolling, Chicago	41.00	39.50	34.50	49.00	27.75
No. 1 Cast, Chicago	38.50	38.50	36.00	41.50	27.50
COKE, Net Ton					
Beehive, Furn, Connlsvl.	$14.75	$14.75	$14.75	$14.75	$14.25
Beehive, Fdry, Connlsvl.	16.75	16.75	16.75	17.00	17.00
Oven Fdry, Chicago	24.50	24.50	24.50	24.50	20.40

NONFERROUS METALS

(cents per pound, carlots, except as otherwise noted)

PRIMARY METALS AND ALLOYS

Aluminum: 99+%, ingots 21.50, pigs 20.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 23.30; No. 13, 5% Si, 23.10; No. 142, 4% Cu, 24.40; No. 195, 4.5% Cu, 0.8% Si, 23.70; No. 214, 3.8% Mg, 24.40; No. 356, 7% Si, 0.3% Mg, 23.20.

Antimony: R.M.M. brand, 99.5% 28.50, Lone Star brand, 29.00, f.o.b. Laredo, Texas, in bulk. Foreign brands, 99.5%, 25.50-26.00 New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa.

Beryllium Copper: 3.75-4.25% Be, $40.00 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa. or Elmore, O.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb del.

Cobalt: 97-99%, $2.60 per lb for 550 lb keg; $2.62 per lb for 100 lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $75.00 per lb, nom.

Copper: Electrolytic 30.00 del. Conn. Valley, 30.125 del. Midwest; Lake 30.00 del.; Fire refined 29.75 del.

Germanium: 99.9%, $295 per lb nom.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $145-$150 per troy oz.

Lead: Common 13.80, chemical 13.90, corroding 13.90, St. Louis; New York basis, add 0.20.

Lithium: 98%, $11-$14 per lb, depending on quantity.

Magnesium: 99.8%, selfpalletizing pig 27.00; notched ingot 27.75, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., and Madison, Ill., add 1.20 for pig and 1.25 for ingot. Sticks, 1.3 in. diameter, 46.00, 100 to 4999 lb, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91C and alloys C, H, G and R 32.50; alloy M 34.50, 10,000 lb or more, f.o.b. Freeport, Tex., or Madison, Ill. Add 1.20 for Port Newark, N. J.

Mercury: Open market, spot, New York, $238-$240 per 76-lb flask.

Molybdenum: Powder 99% hydrogen reduced $3.40 per lb; pressed ingot $4.06 per lb; sintered ingot $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked 60.00; 25-lb pigs 63.65; "XX" nickel shot 63.65; "F" nickel shot or

DAILY NONFERROUS PRICE RECORD

	Price May 6	Last Change	Previous Price	Apr. Avg.	Mar. Avg.	May 1953 Avg.
Copper	30.00	Apr. 12	29.75-30.00	29.955	29.865	29.845
Lead	13.80	Apr. 12	13.55	13.710	12.735	12.550
Zinc	10.25	Mar. 29	9.75	10.250	9.657	11.000
Tin	93.00	May 6	93.25	96.260	92.518	97.240
Nickel	60.00	Jan. 14, 1953	56.50	60.000	60.000	60.000
Aluminum	21.50	July 15, 1953	20.50	21.500	21.500	20.500
Magnesium	27.00	Mar. 9, 1953	24.50	27.000	27.000	27.000

Quotations in cents per pound based on: Copper, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, del. New York; Nickel, electrolytic cathodes, 99.9%, base size at refinery unpacked; Aluminum, primary ingots, 99 + %, del.; Magnesium 99.8%, Freeport, Tex.

ingots for addition to cast iron, 60.00; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $140-$150 per troy oz nom.

Palladium: $21 per troy oz.

Platinum: $84-$87 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $125 per troy oz.

Ruthenium: $70-$75 per troy oz.

Selenium: 99.5%, $5-$6 per lb.

Sodium: 16.50, carlots; 17.00 l.c.l.

Tantalum: Sheet, rod $39.00 per lb; powder $33.50 per lb.

Tellurium: $1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, New York, spot, 93.00; prompt, 93.00.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max.) $4.72; grade A-2 (0.5% Fe max.) $4.46 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000 lb lots $4.65 per lb f.o.b. shipping point; less than 1000 lb $4.80; 99+% hydrogen reduced, $4.95. Treated ingots $6.70.

Zinc: Prime Western 10.25, brass special 10.50, intermediate 10.75, E. St. Louis, freight allowed over 0.50 per pound. High grade 11.60, special high grade 11.75, die casting alloy ingot 14.25, del.

Zirconium: Sponge $10 per lb; powder electronics grade $15, flash grade $11.50.
(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston Alloys 21.00-22.50; No. 13 foundry alloy (No. 2 grade) 20.00-21.00, 5% silicon alloy, 0.60 Cu max., 22.50-23.50; 13 alloy, 0.60 Cu max., 22.50-23.50; 195 alloy 21.75-22.75; 108 alloy 20.50-21.50 steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 21.00-22.00; grade 2, 20.00-21.00; grade 3, 18.50-19.50; grade 4, 18.00-19.00.

Brass Ingot: Red brass, No. 115, 26.00; tin bronze No. 225, 38.50, No. 245, 32.25; high-leaded tin bronze, No. 305, 31.00; No. 1 yellow, No. 405, 22.25; manganese bronze No. 421, 26.75.

Magnesium Alloy Ingot: AZ63A, 31.50; AZ91B, 27.00; AZ91C, 31.50; AZ92A, 31.50.

NONFERROUS MILL PRODUCTS

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 100,000 lb lots, 35.36; 30,000 lb lots, 35.48; l.c.l. 35.98. Weatherproof, 100,000 lb, 36.28; 30,000 lb, 36.53; l.c. 37.03. Magnet wire del., 15,000 lb or more 41.83; l.c.l. 42.58.

LEAD

(Prices to jobbers f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more $19.00 per cwt; pipe, full coils $19.00 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 100,000 lb and over, f.o.b. mill.) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $11; forging billets, $6; hot-rolled and forged bars, $6.

ZINC

Sheets 23.00, f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 19.50-20.50, f.o.b. mill, 36,000 lb and over. Plates 19.00-22.25.

ZIRCONIUM

Plate $27; H.R. strip $28; C.R. strip $35; forged or H.R. bars $27; wire, 0.015 in., 1 cent per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheet, C.R. ...	86.5	67.5	92.5
Strip, C.R. ...	92.5	70.5	98.5
Plate, H.R. ...	84.5	66.5	90.5
Rod, Shapes ..	82.5	65.5	88.5
Seamless Tubes	115.5	100.5	137.5
Shot, Blocks ..	....	60.0	....

ALUMINUM

(30,000 lb base; freight allowed over 499 lb) Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range Inches	Widths or Diameters, In., Inc.	Flat Sheet*	Coiled Sheet	Coiled Sheet Circle†
0.249-0.136	12-49	33.9	...	...
0.135-0.096	12-48	34.4	...	...
0.095-0.077	12-48	35.1	32.7	37.5
0.076-0.061	12-48	35.7	32.9	37.7
0.060-0.048	12-48	36.1	33.2	38.1
0.047-0.038	12-48	36.6	33.6	38.4
0.037-0.030	12-48	37.0	34.0	39.1
0.029-0.024	12-48	37.6	34.3	39.6
0.023-0.019	12-36	38.3	35.1	40.4
0.018-0.017	12-36	39.1	35.7	41.3
0.016-0.015	12-36	40.0	36.5	42.5
0.014	12-24	41.0	37.5	43.8
0.013-0.012	12-24	42.1	38.2	44.8
0.011	12-24	43.1	39.4	46.4
0.010-0.0095	12-24	44.3	40.5	48.0
0.009-0.0085	12-24	45.6	41.9	50.0
0.008-0.0075	12-24	47.1	43.1	51.8
0.007	12-18	48.6	44.6	54.1
0.006	12-18	50.2	46.0	59.1

* 72-180 in. lengths. † 26 in. max. dia.

ALUMINUM

Plates and Circles: Thickness 0.250-3.0 in., 24-60 in. width or dia., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
2S-F, 3S-F	32.4	36.3
50S-F	33.5	37.4
4S-F	34.5	39.1
52S-F	36.2	40.9
61S-T6	37.4	41.5
24S-T4*	39.3	45.4
75S-T6*	47.1	53.7

* 24-48 in. widths or dia., 72-180 in. lengths.

ALUMINUM

Screw Machine Stock: 5000 lb and over.

Dia. (in.) or across flats	Round 11S-T3	Round 17S-T4	Hexagonal 11S-T3	Hexagonal 17S-T4
Drawn				
0.125	59.6	57.9	...	...
0.156-0.172	50.6	48.9	...	...
0.188	50.6	48.9	...	62.4
0.219-0.234	47.9	46.2	...	...
0.250-0.281	47.9	46.2	...	59.5
0.313	47.9	46.2	...	56.8
Cold-finished				
0.375-0.531	46.6	44.9	56.2	53.4
0.563-0.688	46.6	44.9	53.4	50.2
0.750-1.000	45.5	43.8	48.9	47.3
1.063	45.5	43.8	...	45.7
1.125-1.500	43.8	42.1	47.3	45.7
Rolled				
1.563	42.7	41.0	...	...
1.625-2.000	42.1	40.4	...	44.1
2.125-2.500	41.1	39.4	...	...
2.750-3.375	39.9	38.2	...	...

ALUMINUM

Forging Stock: Round, Class 1, 43.8-34.4, in specific lengths 36-144 in. diameters 0.375-8 in.; rectangles and squares, Class 1, 50.2-38.4 in random lengths 0.375-4.0 in. thick, widths 0.750-10.0 in.

Pipe: A.S.A. Schedule 40, alloy 63S-T6, 20 ft length, plain ends, 90,000 lb base, per 100 ft.

Nom. pipe size, in.		Nom. pipe size, in.	
¼	$15.05	2	$ 46.30
1	23.65	4	127.70
1¼	32.00	6	228.50
1½	38.25	8	343.80

MAGNESIUM

Sheet: AZ31, commercial grade, 0.032-in. 94.00, 0.064-in. 73.00, 0.125-in. 60.00, 30,000 lb and over, f.o.b. mill.

Plate: Hot-rolled AZ31, 53.000, 20,000 lb or more 0.250-in. and over, widths to 48 in., lengths to 144 in.; raised pattern floor plate, 59.00, 20,000 lb or more, ¼-in. thick, widths 24-72 in., lengths 60-192 in.

Extrusion Stock: AZ31, Rectangles, ¼ x 2 in. 69.20, 1 x 4 in. 53.00. Rod, 1 in. 66.00, 2 in. 62.50. Tubing, 1 in. OD x 0.065-in. 87.00. Angles, 1 x 1 x ⅛-in. 72.90, 2 x 2 x ⅛-in. 67.00. Channels, 5 in. 67.80. I-Beams, 5 in. 66.20.

NONFERROUS SCRAP

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 2S clippings 13.00; low copper clippings 13.00; mixed clippings 11.00-12.00; old sheet 10.50-11.00; borings and turnings 7.00; pistons and struts 7.00; crankcases 10.00-11.00; industrial castings 10.00-11.00.

Copper and Brass: Heavy copper and wire, No. 1 24.50; No. 2 copper 23.00; light copper 21.00; No. 1 composition red brass 18.50; No. 1 composition turnings 18.00; mixed brass turnings 13.00; new brass clippings 18.00; No. 1 brass rod turnings 14.00; light brass 12.00; heavy yellow brass 14.00; new brass rod ends 15.00; auto radiators, unsweated 14.00; cocks and faucets 16.00; brass pipe 17.00.

Lead: Heavy 10.75-11.25; battery plate 5.75-6.25; linotype and stereotype 13.00; electrotype 11.25; mixed babbitt 12.75.

Magnesium: Clippings 18.50-19.50; clean castings 17.50-18.50; iron castings, not over 10% removable Fe, 16.50-17.50.

Monel: Clippings 24.00-26.00; old sheet 22.00-24.00; turnings 16.00-18.00; rods 23.00-25.00.

Nickel: Sheets and clips 60.00-65.00; rolled anodes 60.00-65.00; turnings 40.00; rod ends 60.00-65.00.

Tin: No. 1 pewter 55.00-60.00; block tin pipe 75.00-80.00; No. 1 babbitt 45.00-50.00.

Zinc: Old zinc, 4.50; new die cast scrap, 4.00; old die cast scrap, 3.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 2S, 3S clippings 15.00-15.50; 51S, 52S clippings 15.00-15.50; 14S, 17S, 24S clippings 14.00-14.50; mixed clippings 13.50-14.50; old sheet 12.50-13.00; old cast 12.50-13.00; clean old cable, free of steel 15.00-15.50; borings and turnings 13.00-13.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 42.00; light scrap 37.00.

Copper, Brass: No. 1 copper 26.75-27.00; No. 2 copper 25.25-25.50; light copper 23.75-24.00; refinery brass (60% copper) per dry copper content 22.25-22.50; auto radiators, 16.25.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper, Brass: No. 1 copper 26.75-27.00; No. 2 copper 25.25-25.50; light copper 23.75-24.00; No. 1 composition borings 19.50-20.00; No. 1 composition solids 20.00-20.50; heavy yellow brass solids 15.50-16.00; yellow brass turnings 14.75-15.00; radiators 16.50.

PLATING MATERIALS

(F.o.b. shipping points, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes $1.75 per lb.

Copper: Flat-rolled 45.04, oval 44.54, 2000-5000 lb; electrodeposited 39.78, cast 42.04, 5000-10,000 lb lots.

Nickel: Depolarized, less than 500 lb 92.00; 500-4999 lb 88.00; over 5000 lb 86.00.

Tin: Bar or slab, less than 200 lb $1.125; 200-499 lb $1.11; 500-999 lb $1.105; 1000 lb or more $1.10.

Zinc: Bar 18.50, bar or flat top 17.50, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100 lb drums.

Chromic Acid: Less than 10,000 lb 28.50; over 10,000 lb 27.50.

Copper Cyanide: Under 1000 lb 63.90, 1000 lb and over 61.90.

Copper Sulphate: 100-6000 lb 11.35; 6000-12,000 lb 11.10; 12,000-24,000 lb 10.85; 24,000-36,000 lb 10.60; 36,000 lb and over 10.35.

Nickel Chloride: 100 lb 45.00; 200 lb 43.00; 300 lb 42.00; 400-4900 lb 40.00; 5000-9900 lb 38.00; 10,000 lb and over 37.00.

Nickel Sulphate: 100 lb 37.00; 200 lb 35.00; 300 lb 34.00; 400-4900 lb 32.00; 5000-35,000 lb 30.00; 36,000 lb and over 29.00.

Silver Cyanide: Cents per ounce, 16 oz 80.625; 100 oz 78.50; 25,000 oz and over 77.325.

Sodium Cyanide: Egg, under 1000 lb 19.80; 1000-19,900 lb 18.80; 20,000 lb and over 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb 71.5; 100-600 lb 57.2; 700-1900 lb 54.7; 2000-9900 lb 53; 10,000 lb or more 51.9.

Stannous Chloride (Anhydrous): Less than 50 lb $1.576; 50 lb $1.236; 100-300 lb $1.086; 400-900 lb $1.061; 1000-1900 lb $1.037; 200-4900 lb $1; 5000-19,000 lb 93.9; 20,000 lb and over 87.8.

Stannous Sulphate: Less than 50 lb $1.275; 50 lb 97.5; 100-1900 lb 95.5; 2000 lb and over 93.5.

Zinc Cyanide: Under 1000 lb 54.30, 1000 lb and over 52.30.

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	48.38b	45.98c	....	48.44	26.000	26.000	25.250
Yellow Brass	41.72	33.50d	42.26	44.63	19.750	19.500	18.000
Red Brass, 85%	45.44	45.38	45.98	48.25	23.000	22.750	22.250
Low Brass, 80%	44.47	44.41	45.01	47.28	22.125	21.875	21.375
Naval Brass	45.76	40.07	52.80	48.92	18.250	18.000	17.500
Commercial Bronze, 90% ..	46.95	46.89	47.49	49.51	23.875	23.625	23.125
Nickel Silver, 10%	55.36	59.43g	57.69	....	23.625	23.375	11.813
Phosphor Bronze, A, 5% ..	66.58	67.08	67.08	68.23	26.125	25.875	24.875
Silicon Bronze	52.71	51.90	52.73	70.11e	25.125	24.875	24.125
Manganese Bronze	49.48	43.62	54.06	....	18.250	18.000	17.500
Munts Metal	43.96	39.77	....	....	18.625	18.375	17.875

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 pounds, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded.

Nonferrous Metals

Copper displays immunity to business decline. Price has held firm, a new bullishness develops, and the world's biggest producer of the metal steps up output

THE AXIOM among copper men that their business closely parallels the steel ingot rate has a hollow ring in today's market.

Bullishness over the red metal is easier to find than at anytime in the last six months. It has withstood the combined assaults of a general business slowdown and depressants peculiar to the industry.

No Tailspin—Neither fabricators' inventory surgery nor ominous stocks of ready copper piled up in Chile have precipitated a tailspin. Copper has succeeded in outrolling the "rolling readjustment."

Dodging the widely-predicted price shakedown, it has held within a cent of 30-cents for a solid year. Consensus is that it will be hard to dislodge from its present level for some time.

Sales Up—One sign of market optimism comes from Kennecott Copper Corp., world's largest producer. It's returning to six-day operations at its western mines next week. Some 1200 laid-off employees will be recalled, though a 40-hour week will be maintained.

The company's move reinstates about half its production cutbacks put into effect two months ago and means about 5000 tons more of refined copper monthly will be ready for market commencing in mid-August. It also arouses speculation that output in Chile will likewise be boosted, though no such decision has yet been made. Kennecott President Charles R. Cox believes business in the second quarter will be "appreciably better" than in the first. April sales by the company topped production and allowed reduction in stocks of refined copper.

Manageable Surplus — Another healthy move is in whittling down to manageable size the huge stocks of unsold copper in Chile. Details on purchase of 100,000 tons for the U. S. stockpile are about ready for announcement. Additional sales to Europe have probably lowered the surplus below the 40,000-ton mark.

Incoming orders are best of the year, brass mills report. Air conditioning and auto industries are in the market for greater volume, and building activity is bringing in business and encouraging production of refrigerators and other appliances. Purchasing men say everything bought from now on will be going into production and not into stocks, which means all new upturns on the fabrication level will work quickly back to mills.

Another Try—Wire mills find inquiries and orders coming in at above-seasonal levels, both in number and in size. Most of the rise is in insulated products. Another try at increased prices is possible; keen competition and price cutting have doomed previous attempts. Industrial building accounts for substantial inquiries, public utilities are coming back into the buying herd, and contractors in general are more actively in the market.

STEEL's Metal Price Averages for Apr., 1954

(Cents per pound)

Electrolytic Copper, del. Conn.	29.955
Lead, St. Louis	13.710
Prime Western Zinc, E. St. Louis	10.250
Straits Tin, New York	96.260
Primary Aluminum Ingots, del.	21.500
Magnesium, Freeport, Tex.	27.000
Nickel, f.o.b. refinery	60.000

No Need for Stockpiling

Because lead and zinc markets are still holding their gains of March-April, stockpiling is not yet needed. The program is purely political in that there's no great need for stockpiling either metal except to buck up the market, so the longer the delay, the more effective it will be.

The summer months are normally ones of slack demand, so a purchase program then would do little to stir buying. Thus the possibility that stockpiling will be held off until fall can't be discounted. Washington talk centers on where the money is coming from. Most-mentioned answer: The funds earmarked for another commodity and still unspent could be directed to lead and zinc. Stockpiling procedure requires the government to ask producers for offers stating tonnage and price. While amounts bought are not announced, you can tell when quotas are filled when requests for reoffers end.

In day-to-day markets, average buying is growing more popular. An immediate nosedive is not in prospect though. Custom smelters are still accumulating both lead and zinc, which is a tipoff on their thinking. Lead business is above the first-quarter rate, and the batterymakers will enter the market about the end of May to satisfy their high-gear July operations. Zinc has returned to about a first-quarter level. Diecasting is a bright spot, but no noticeable pickup in galvanizing or brass mill use is reported. Lead men note the recent devaluation of the peso gives Mexican producers a temporary price edge on competition, though higher export taxes and pending wage increases level off the gain.

Beryllium Capacity Plentiful

Beryllium production capacity is now considerably above current demands, according to a report made to Interior Secretary McKay. It's something industry has been telling the government for over a year. Consumption of beryl last year was only 2662 tons and total supply of 8996 tons was highest in history. Supply of beryl has topped consumption each year since 1949. Commercial-grade beryl contains about 3.6 to 4.5 per cent beryllium, and imports account for close to 90 per cent of supply.

More Metal for Civilians

Direct defense take of steel, copper and aluminum is scheduled to slide sharply in the third quarter as fabricators will be using more inventoried metal. Defense and atomic energy "A" products will be off 42 per cent for steel (to 742,271 tons), 20 per cent for aluminum (to 57,279 tons) and 36 per cent for copper and its alloys (to 42,528 tons) in comparison with second-quarter allowances. Aircraft and ammunition slowdowns are chief causes.

Market Memo

• A plant to turn out about three tons of metallic titanium daily is reportedly being planned by Kennecott Copper Corp. Company owns two-thirds of the $48-million Quebec Iron & Titanium Corp. which now produces titanium slag only.

every grade of ZINC

for urgent military and

civilian requirements

SLAB ZINC

PRIME WESTERN

SELECT

BRASS SPECIAL

INTERMEDIATE

HIGH GRADE

SPECIAL HIGH GRADE

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Columbus, O. Chicago St. Louis New York

STEEL PRICES

Mill prices as reported to STEEL, cents per pound except as otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on page 183. Key to footnotes, page 185.

SEMIFINISHED

INGOTS, Carbon Forging (NT)
Fontana,Calif. K1 ...$86.00
Munhall,Pa. U5 .....59.00

INGOTS, Alloy (NT)
Detroit R7 .....$63.00
Fontana,Calif. K1 ....88.00
Midland,Pa. C18 .....62.00
Munhall,Pa. U5 .....62.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)
Aliquippa,Pa. J5 ....$62.00
Bessemer,Pa. U5 .....62.00
Clairton,Pa. U5 .....62.00
Ensley,Ala. T2 .....62.00
Fairfield,Ala. T2 .....62.00
Fontana,Calif. K1 ....70.00
Gary,Ind. U5 .....62.00
Johnstown,Pa. B2 ....62.00
Lackawanna,N.Y. B2..62.00
Munhall,Pa. U5 .....62.00
So.Chicago,Ill. U5 ....62.00
So.Duquesne,Pa. U5 ..62.00

Carbon, Forging (NT)
Aliquippa,Pa. J5 .....$75.50
Bessemer,Pa. U5 .....75.50
Buffalo R2 .....75.50
Clairton,Pa. U5 .....75.50
Cleveland R2 .....75.50
Conshohocken,Pa. A3 ..80.50
Detroit R7 .....78.50
Ensley,Ala. T2 .....75.50
Fairfield,Ala. T2 .....75.50
Fontana,Calif. K1 ....83.50
Gary,Ind. U5 .....75.50
Geneva,Utah C11 ....75.50
Houston S5 .....83.50
Johnstown,Pa. B2 ....75.50
Lackawanna,N.Y. B2..75.50
LosAngeles B3 .....85.00
Munhall,Pa. U5 .....75.50
Seattle B3 .....89.00
So.Chicago R2,U5,W14.75.50
So.Duquesne,Pa. U5 ..75.50
So.SanFrancisco B3 ...85.00

Alloy, Forging (NT)
Bethlehem,Pa. B2 ....$82.00
Buffalo R2 .....82.00
Canton,O. R2, T7 ....82.00
Conshohocken,Pa. A3..89.00
Detroit R7 .....84.00
Fontana,Calif. K1 ....101.00
Gary,Ind. U5 .....82.00
Houston S5 .....90.00
Ind.Harbor,Ind. Y1 ..82.00
Johnstown,Pa. B2 ....82.00
Lackawanna,N.Y. B2 ..82.00
LosAngeles B3 .....102.00
Massillon,O. R2 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
So.Chicago R2,U5,W14.82.00
So.Duquesne,Pa. U5 ..82.00
Struthers,O. Y1 .....82.00
Warren,O. C17 .....82.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$92.50
Canton,O. R2 .....92.50
Cleveland R2 .....92.50
Fontana,Calif. K1 ....113.50
Gary,Ind. U5 .....92.50
Massillon,O. R2 .....92.50
So.Chicago,Ill. R2 ....92.50
So.Duquesne,Pa. U5 ..92.50

SHEET BAR (NT)
Fontana,Calif. K1 ...$93.18

SKELP
Aliquippa,Pa. J5 .....3.85
Munhall,Pa. U5 .....3.75
Warren,O. R2 .....3.75
Youngstown R2, U5 ....3.75

WIRE RODS
AlabamaCity,Ala. R2 ..4.525
Aliquippa,Pa. J5 ....4.525
Alton,Ill. L1 .....4.70
Buffalo W12 .....4.525
Cleveland A7 .....4.525
Donora,Pa. A7 .....4.525
Fairfield,Ala. T2 .....4.525
Fontana,Calif. K1 ....5.325
Houston S5 .....4.925
Johnstown,Pa. B2 ....4.525
Joliet,Ill. A7 .....4.525
KansasCity,Mo. S5 ....4.865
Kokomo,Ind. C16 .....4.625
LosAngeles B3 .....5.325
Minnequa,Colo. C10 ..4.775
Monessen,Pa. P7 .....4.525
No.Tonawanda,N.Y.B11 4.525
Pittsburg,Calif. C11 ..5.175
Portsmouth P12 .....4.525
Roebling,N.J. R5 ....4.625
So.Chicago,Ill. R2 ....4.525
SparrowsPoint,Md. B2..4.625
Sterling,Ill.(1) N15 ...4.525
Struthers,O. Y1 .....4.525
Torrance,Calif. C11 ...5.325
Worcester,Mass. A7 ...4.825

STRUCTURALS

Carbon Steel Stand. Shapes
AlabamaCity,Ala. R2 ...4.10
Aliquippa,Pa. J5 .....4.10
Bessemer,Ala. T2 .....4.10
Bethlehem,Pa. B2 .....4.15
Clairton,Pa. U5 .....4.10
Fairfield,Ala. T2 .....4.10
Fontana,Calif. K1 ....4.75
Gary,Ind. U5 .....4.10
Geneva,Utah C11 .....4.10
Houston S5 .....4.50
Ind.Harbor,Ind. I-2 ....4.19
Johnstown,Pa. B2 .....4.15
KansasCity,Mo. S5 ....4.70
Lackawanna,N.Y. B2 ..4.15
LosAngeles B3 .....4.80
Minnequa,Colo. C10 ....4.55
Munhall,Pa. U5 .....4.10
Niles,Calif. P1 .....4.80
Phoenixville,Pa. P4 ....4.15
Seattle B3 .....4.85
So.Chicago,Ill. U5, W14.4.10
So.SanFrancisco B3 ....4.75
Torrance,Calif. C11 ....4.80
Weirton,W.Va. W6 ....4.10

Wide Flange
Bethlehem,Pa. B2 .....4.15
Clairton,Pa. U5 .....4.10
Fontana,Calif. K1 ....5.10
Lackawanna,N.Y. B2 ..4.15
Munhall,Pa. U5 .....4.10
Phoenixville,Pa. P4 ....4.15
So.Chicago,Ill. U5 ....4.10

Alloy Stand. Shapes
Clairton,Pa. U5 .....5.00
Fontana,Calif. K1 ....6.40
Gary,Ind. U5 .....5.00
Munhall,Pa. U5 .....5.00
So.Chicago,Ill. U5 ....5.00

H.S., L. A. Stand. Shapes
Aliquippa,Pa. J5 .....6.175
Bessemer,Ala. T2 ....6.175
Bethlehem,Pa. B2 ....6.20
Clairton,Pa. U5 .....6.175
Fairfield,Ala. T2 ....6.175
Fontana,Calif. K1 ....6.825
Gary,Ind. U5 .....6.175
Geneva,Utah C11 ....6.175
Ind.Harbor,Ind. I-2 ...6.175
Ind.Harbor,Ind. Y1 ...6.675
Johnstown,Pa. B2 .....6.20
Lackawanna,N.Y. B2 ..6.20
LosAngeles B3 .....6.85
Munhall,Pa. U5 .....6.175
Seattle B3 .....6.90
So.Chicago,Ill. U5,W14.6.175
So.SanFrancisco B3 ....6.80
Struthers,O. Y1 .....6.675

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 .....6.20
Lackawanna,N.Y. B2...6.20
Munhall,Pa. U5 .....6.125
So.Chicago,Ill. U5 ....6.125

PILING

Bearing Piles
Munhall,Pa. U5 .....4.10
So.Chicago,Ill. U5 ....4.10

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ...4.925
Lackawanna,N.Y. B2 ..4.925
Munhall,Pa. U5 .....4.925
So.Chicago,Ill. U5 ....4.925

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..4.10
Aliquippa,Pa. J5 .....4.10
Ashland,Ky. (15) A10 ..4.10
Bessemer,Ala. T2 .....4.10
Clairton,Pa. U5 .....4.10
Claymont,Del. C22 .....4.10
Cleveland J5, R2 .....4.10
Coatesville,Pa. L7 .....4.10
Conshohocken,Pa. A3 ..4.10
Ecorse,Mich. G5 .....4.25
Fairfield,Ala. T2 .....4.10
Fontana,Calif.(30) K1 ..4.75
Gary,Ind. U5 .....4.10
Geneva,Utah C11 .....4.10
GraniteCity,Ill. G4 .....4.30
Harrisburg,Pa. C5 .....4.10
Houston S5 .....4.50
Ind.Harbor,Ind. I-2, Y1.4.10
Johnstown,Pa. B2 .....4.10
Lackawanna,N.Y. B2 ...4.10
LoneStar,Tex. L6 .....4.40
Minnequa,Colo. C10 ....4.95
Munhall,Pa. U5 .....4.10
Pittsburgh J5 .....4.10
Riverdale,Ill. A1 .....4.10
Seattle B3 .....5.00
Sharon,Pa. S3 .....4.10
So.Chicago,Ill. U5, W14 4.10
SparrowsPoint,Md. B2 ..4.10
Steubenville,O. W10 ....4.10
Warren,O. R2 .....4.10
Weirton,W.Va. W6 ....4.10
Youngstown R2, U5, Y1.4.10

PLATES, Carbon Abras. Resist.
Fontana,Calif. K1 .....5.90
Geneva,Utah C11 .....5.25

PLATES, Wrought Iron
Economy,Pa. B14 .....9.30

PLATES, High-Strength Low-Alloy
Aliquippa,Pa. J5 .....6.25
Bessemer,Ala. T2 .....6.25
Clairton,Pa. U5 .....6.25
Cleveland J5 .....6.25
Conshohocken,Pa. A3 ..6.25
Ecorse,Mich. G5 .....6.40
Fairfield,Ala. T2 .....6.25
Fontana,Calif.(30) K1 ..6.95
Gary,Ind. U5 .....6.25
Geneva,Utah C11 .....6.25
Ind.Harbor,Ind. I-2 ...6.25
Ind.Harbor,Ind. Y1 ....6.75
Johnstown,Pa. B2 .....6.25
Lackawanna,N.Y. B2 ...6.25
Munhall,Pa. U5 .....6.25
Pittsburgh J5 .....6.25
Seattle B3 .....7.15
Sharon,Pa. S3 .....6.25
So.Chicago,Ill. U5, W14.6.25
SparrowsPoint,Md. B2 ..6.25
Youngstown U5 .....6.25
Youngstown Y1 .....6.75

PLATES, Alloy
Claymont,Del. C22 ....5.55
Coatesville,Pa. L7 .....5.55
Fontana,Calif. K1 .....6.60
Gary,Ind. U5 .....5.55
Johnstown,Pa. B2 .....5.55
Munhall,Pa. U5 .....5.55
Sharon,Pa. S3 .....5.55
So.Chicago,Ill. U5, W14.5.55
SparrowsPoint,Md. B2 ..5.55

FLOOR PLATES
Cleveland J5 .....5.15
Conshohocken,Pa. A3 ...5.15
Harrisburg,Pa. C5 .....5.15
Ind.Harbor,Ind. I-2 ....5.15
Munhall,Pa. U5 .....5.15
So.Chicago,Ill. U5 .....5.15

PLATES, Ingot Iron
Ashland c.l. (15) A10 ..4.35
Ashland l.c.l.(15) A10..4.85
Cleveland c.l. R2 .....4.70
Warren,O. c.l. R2 ....4.70

BARS

BARS, Hot-Rolled Carbon
Aliquippa,Pa. J5 .....4.15
Alton,Ill. L1 .....4.35
Atlanta,Ga. A11 .....4.35
Bessemer,Ala. T2 .....4.15
Birmingham,Ala. C15 ...4.15
Buffalo(31) R2 .....4.18
Clairton,Pa. U5 .....4.15
Cleveland(31) R2 .....4.21
Detroit R7 .....4.30
Ecorse,Mich. G5 .....4.30
Emeryville,Calif. J7 ....4.90
Fairfield,Ala. T2 .....4.15
Fairless,Pa. U5 .....4.30
Fontana,Calif. K1 .....4.85
Gary,Ind. U5 .....4.15
Gadsden,Ala.(31) R2 ...4.18
Houston S5 .....4.55
Ind.Harbor,Ind. I-2, Y1.4.15
Johnstown,Pa. B2 .....4.15
KansasCity,Mo. S5 ....4.75
Lackawanna,N.Y. B2 ...4.15
LosAngeles B3 .....4.85
Milton,Pa. M18 .....4.15
Minnequa,Colo. C10 ....4.75
No.Tonawanda,N.Y. B11.4.15
Pittsburg,Calif. C11 ....4.85
Pittsburgh J5 .....4.15
Portland,Oreg. O4 .....4.90
Seattle B3, N14, P23....4.90
So.Chicago U5, W14 ....4.15
Chicago(31) R2 .....4.22
So.Duquesne,Pa. U5 ....4.15
So.SanFran.,Calif. B3 ..4.90
Sterling,Ill. (1) N15 ...4.15
Struthers,O. Y1 .....4.15
Torrance,Calif. C11 ....4.85
Weirton,W.Va. W6 ....4.15
Youngstown U5 .....4.15
Youngstown(31) R2 ....4.20

Bars, Hot-Rolled Alloy
Bethlehem,Pa. B2 ....4.875
Buffalo R2 .....4.875
Canton,O. R2, T7 ....4.875
Clairton,Pa. U5 .....4.875
Detroit R7 .....4.975
Ecorse,Mich. G5 .....5.025
Fairless,Pa. U5 .....5.025
Fontana,Calif. K1 ....5.925
Gary,Ind. U5 .....4.875
Houston S5 .....5.275
Ind.Harbor,Ind. I-2,Y1.4.875
Johnstown,Pa. B2 .....4.875
KansasCity,Mo. S5 ....5.475
Lackawanna,N.Y. B2 ..4.875
LosAngeles B3 .....5.925
Massillon,O. R2 .....4.875
Midland,Pa. C18 .....4.875
So.Chicago R2,U5,W14.4.875
So.Duquesne,Pa. U5 ...4.875
Struthers,O. Y1 .....4.875
Warren,O. C17 .....4.875
Youngstown U5 .....4.875

BARS & SMALL SHAPES, H.R.
High-Strength Low-Alloy
Aliquippa,Pa. J5 .....6.225
Bessemer,Ala. T2 .....6.225
Bethlehem Pa. B2 .....6.225
Clairton,Pa. U5 .....6.225
Ecorse,Mich. G5 .....6.375
Fairfield,Ala. T2 .....6.225
Fontana Calif. K1 ....7.475
Gary,Ind. U5 .....6.225
Ind.Harb.Ind. Y1 ....6.725
Ind.Harb.,Ind. I-2 ....6.225
Johnstown,Pa. B2 .....6.225
Lackawanna,N.Y. B2 ..6.225
LosAngeles B3 .....6.925
Pittsburgh J5 .....6.225
Seattle B3 .....6.975
So.Chicago W14 .....6.225
So.Duquesne,Pa. U5 ...6.225
So.SanFrancisco B3 ...6.975
Struthers,O. Y1 .....6.725
Youngstown U5 .....6.225

BAR SIZE ANGLES;H.R.CARBON
Bethlehem,Pa. B2 .....4.35

BAR SIZE ANGLES: S. Shapes
Aliquippa,Pa. J5 .....4.15
Atlanta A11 .....4.35
Niles,Calif. P1 .....4.85
SanFrancisco S7 .....5.10

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. U5 .....5.00
Fontana,Calif. K1 ....5.925
Gary,Ind. U5 .....5.00
Houston S5 .....5.60
KansasCity S5 .....5.60
Youngstown U5 .....5.00

BARS, Cold-Finished Carbon
Ambridge Pa. W18 .....5.20
BeaverFalls,Pa. M12,R2.5.20
Buffalo B5 .....5.25
Camden,N.J. P13 .....5.65
Carnegie,Pa. C12 .....5.20
Chicago W18 .....5.20
Cleveland A7, C20 ....5.20
Detroit P17, R7 .....5.35
Detroit B5 .....5.40
Donora,Pa. A7 .....5.20
Elyria,O. W8 .....5.20
Franklin Park,Ill. N5 ..5.20
Gary,Ind. R2 .....5.20
GreenBay,Wis. F7 .....5.20
Hammond,Ind. L2, M13..5.20
Hartford,Conn. R2 ....5.75
Harvey,Ill. B5 .....5.20
LosAngeles R2, S30 ....6.65
Mansfield,Mass. B5 ....5.75
Massillon,O. R2, R8 ...5.20
Monaca,Pa. S17 .....5.20
Newark,N.J. W18 .....5.65
NewCastle,Pa.(17) B4 ..5.20
Pittsburgh J5 .....5.20
Plymouth,Mich. P5 ....5.45
Putnam,Conn. W18 .....5.75
Readville,Mass. C14 ....5.75
St.Louis,Mo. M5 .....5.50
So.Chicago,Ill. W14 ....5.20
SpringCity,Pa. K3 .....5.65
Struthers,O. Y1 .....5.20
Waukegan,Ill. A7 .....5.20
Worcester,Mass. W19 ...6.10
Youngstown F3, Y1 ....5.20

BARS, Cold-Finished Alloy
(Turned and Ground)
Cumberland,Md.(5) C19.4.45

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....6.325
BeaverFalls,Pa. M12 ..6.325
Bethlehem,Pa. B2 .....6.325
Buffalo B5 .....6.325
Camden,N.J. P13 .....6.50
Canton,O. R2, T7 ....6.325
Carnegie,Pa. C12 .....6.325
Chicago W18 .....6.325
Cleveland A7, C20 ....6.325
Detroit R7 .....6.425
Detroit P17 .....6.475
Detroit B5 .....6.525
Donora,Pa. A7 .....6.325
Elyria,O. W8 .....6.325
Gary,Ind. R2 .....6.325
Hammond,Ind. L2,M13..6.325
Hartford,Conn. R2 ....6.775
Harvey,Ill. B5 .....6.325
Lackawanna,N.Y. B2 ..6.325
Mansfield Mass. B5 ..6.775
Massillon,O. R2, R8 ...6.325
Midland,Pa. C18 .....6.325
Monaca,Pa. S17 .....6.325
Newark,N.J. W18 .....6.65
Plymouth,Mich. P5 ....6.525
So.Chicago,Ill. R2,W14..6.325
SpringCity,Pa. K3 .....6.50
Struthers,O. Y1 .....6.325
Warren,O. C17 .....6.325
Waukegan,Ill. A7 .....6.325
Worcester,Mass. A7 ...6.625
Youngstown F3, Y1 ....6.325

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ..4.15
Atlanta A11 .....4.35
Birmingham,Ala. C15 ...4.15
Buffalo R2 .....4.15
Cleveland R2 .....4.15
Emeryville,Calif. J7 ....4.90
Fairfield,Ala. T2 .....4.15
Fairless,Pa. U5 .....4.30
Fontana,Calif. K1 ....4.85
Gary Ind. U5 .....4.15
Houston S5 .....4.55
Ind.Harbor,Ind. I-2, Y1.4.15
Johnstown,Pa. B2 .....4.15
KansasCity,Mo. S5 ....4.75
Lackawanna,N.Y. B2 ...4.15
LosAngeles B3 .....4.85
Milton,Pa. M18 .....4.15
Minnequa,Colo. C10 ....4.75
Niles,Calif. P1 .....4.85
Pittsburg,Calif. C11 ....4.85
Pittsburgh J5 .....4.15
SandSprings,Okla. S5 ..5.00
Seattle B3, N14, P23...4.90
So.Chicago,Ill. R2 .....4.15
So.Duquesne,Pa. U5 ....4.15
So.SanFrancisco B3 ....4.90
SparrowsPoint,Md. B2 ..4.15
Sterling,Ill.(1) N15 ....4.15
Struthers,O. Y1 .....4.15
Torrance,Calif. C11 ....4.85
Youngstown R2, U5 ....4.15

BARS, Reinforcing
(Fabricated; to consumers)
Johnstown, ¼-1" B2 ...5.55
KansasCity S5 .....6.35
LosAngeles B3 .....5.80
Marion,O. P11 .....5.55
Seattle N14 .....5.80
Seattle B3, P23 .....5.85
So.SanFrancisco B3 ....5.85
SparrowsPt. ½-1" B2 ..5.55
Williamsport,Pa. S19 ...5.45

RAIL STEEL BARS
Avis,Pa.(3) J8 .....4.25
ChicagoHts.(3) C2, I-2..4.05
ChicagoHts.(4) C2, I-2..4.15
Ft.Worth,Tex.(26) T4 ..4.65
Franklin,Pa.(3) F5 ....4.05
Franklin,Pa.(4) F5 ....4.15
Marion,O.(3) P11 .....4.00
Moline,Ill.(3) R2 .....4.15
Tonawanda(3,4) B12 ....4.15
Williamsport,Pa.(3) S19.4.25
Williamsport,Pa.(4) S19.5.45

BARS, Wrought Iron
Economy,Pa.(S.R.)B14 10.40
Economy Pa.(D.R.)B14 12.90
Economy(Staybolt) B14 13.20
McK.Rks.(S.R.) L5 ...10.40
McK.Rks.(D.R.) L5 ...14.00
McK.Rks.(Staybolt) L5.15.50

SHEETS

SHEETS, Hot-Rolled Steel
(18 gage and heavier)
AlabamaCity,Ala. R2 ..3.925
Allenport,Pa. P7 .....3.925
Ashland,Ky.(8) A10 ...3.925
Cleveland J5, R2 .....3.925
Conshohocken,Pa. A3 ...3.975
Detroit M1 .....4.075
Ecorse,Mich. G5 .....4.075
Fairfield,Ala. T2 .....3.925
Fairless,Pa. U5 .....3.975
Fontana,Calif. K1 ....4.70
Gary,Ind. U5 .....3.925
Geneva,Utah C11 .....4.025
GraniteCity,Ill. G4 ....4.125
Ind.Harbor,Ind. I-2, Y1.3.925
Irvin,Pa. U5 .....3.925

Kokomo,Ind. C16 ....4.025
Lackawanna,N.Y. B2 .3.925
Munhall,Pa. U5 .....3.925
Newport,Ky. N9 .....3.925
Niles,O. N12 .....5.175
Pittsburg,Calif. C11 ...4.625
Pittsburgh J5 .....3.925
Portsmouth,O. P12 ....3.925
Riverdale,Ill. A1 .....3.925
Sharon,Pa. S3 .....3.925
So.Chicago,Ill. W14 ....3.925
SparrowsPoint,Md. B2.3.925
Steubenville,O. W10 ...3.925
Torrance,Calif. C11 ...4.625
Warren,O. R2 .....3.925
Weirton,W.Va. W6 ...3.925
Youngstown U5, Y1 ...3.925

SHEETS H.R. (19 gage)
AlabamaCity,Ala. R2 .5.225
Dover,O. R1 .....5.05
Kokomo,Ind. C16 ....5.025
Mansfield,O. E6 .....5.05
Niles,O. N12 .....4.775
Torrance,Calif. C11 ....5.875

SHEETS, H.R. (14 ga. heavier) High-Strength Low-Alloy
Cleveland J5, R2 .....5.90
Conshohocken,Pa. A3 ..5.90
Ecorse,Mich. G5 .....6.05
Fairfield,Ala. T2 .....5.90
Fairless,Pa. U5 .....5.95
Fontana,Calif. K1 ....6.675
Gary,Ind. U5 .....5.90
Ind.Harbor,Ind. I-2 ....5.90
Ind.Harbor,Ind. Y1 ....6.40
Irvin,Pa. U5 .....5.90
Lackawanna(35) B2 ...5.90
Munhall,Pa. U5 .....5.90
Pittsburgh J5 .....5.90
Sharon,Pa. S3 .....5.90
So.Chicago,Ill. U5 .....5.90
SparrowsPoint (36) B2 ..5.90
Warren, O. R2 .....5.90
Weirton,W.Va. W6 ....5.90
Youngstown U5 .....5.90
Youngstown Y1 .....6.40

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)
Ashland,Ky.(8) A10 ..4.175
Cleveland R2 .....4.525
Ind.Harbor,Ind. I-2 ..4.175
Warren,O. R2 .....4.525

SHEETS, Cold-Rolled Steel (Commercial Quality)
Allenport,Pa. P7 .....4.775
Cleveland J5, R2 .....4.775
Ecorse,Mich. G5 .....4.925
Fairfield,Ala. T2 .....4.775
Fairless,Pa. U5 .....4.825
Follansbee,W.Va. F4 ..4.775
Fontana,Calif. K1 ....5.875
Gary,Ind. U5 .....4.775
GraniteCity,Ill. G4 ....4.975
Ind.Harbor,Ind. I-2,Y1.4.775
Irvin,Pa. U5 .....4.775
Lackawanna,N.Y. B2. .4.775
Middletown,O. A10 ....4.775
Pittsburg,Calif. C11 ...5.725
Pittsburgh J5 .....4.775
Portsmouth,O. P12 ....4.775
SparrowsPoint,Md. B2. .4.775
Steubenville,O. W10 ...4.775
Warren,O. R2 .....4.775
Weirton,W.Va. W6 ....4.775
Youngstown Y1 .....4.775

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 .....7.225
Ecorse,Mich. G5 .....7.375
Fairless,Pa. U5 .....7.275
Fontana,Calif. K1 ....8.275
Gary,Ind. U5 .....7.225
IndianaHarbor,Ind. Y1.7.725
Irvin,Pa. U5 .....7.225
Lackawanna(37) B2 ...7.225
Pittsburgh J5 .....7.225
SparrowsPoint (38) B2.7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225
Youngstown Y1 .....7.725

SHEETS, Cold-Rolled Ingot Iron
Cleveland R2 .....5.375
Middletown,O. A10 ....5.275
Warren,O. R2 .....5.375

SHEETS, Culvert	**Cu Alloy**	**Cu Fe**
Ashland,Ky. A10	6.325	....
Canton,O. R2	6.075	6.675
Fairfield T2	6.075	6.325
Gary,Ind. U5	6.075	6.325
Ind.Harbor I-2	6.075	6.325
Irvin,Pa. U5	6.075	6.325
Kokomo,Ind. C16	6.175	....
MartinsFry.,O.W10	6.075	....
Pitts.,Calif. C11	6.825	....
SparrowsPt. B2	6.075	....
Torrance,Cal. C11	7.075	....

SHEETS, Culvert Pure Iron
Ashland,Ky. A10 ....6.575
Fairfield,Ala. T2 ....6.325
MartinsFerry,O. W10..6.325

SHEETS, Gal'd No. 10 Steel
AlabamaCity,Ala. R2 ..5.275
Ashland,Ky(8) A10 ...5.275
Canton,O. R2 .....5.275
Delphos,O. N16 .....5.775
Dover,O. R1 .....5.275
Fairfield, Ala. T2 ....5.275†
Gary,Ind. U5 .....5.275†
GraniteCity, Ill. G4 ....5.475
Ind.Harbor,Ind. I-2 ...5.275
Irvin,Pa. U5 .....5.275†
Kokomo, Ind. C16 ....5.375†
MartinsFerry,O. W10..5.275
Niles,O. N12 .....5.275
Pittsburg,Calif. C11 ..6.025†
SparrowsPoint,Md. B2.5.275
Steubenville O. W10 ..5.275
Torrance,Calif, C11 ..6.275†
Weirton,W.Va. W6 ....5.275

† Based on 5c zinc

SHEETS, Galvanized No. 10 High-Strength Low-Alloy
Irvin,Pa. U5 .....7.925
SparrowsPoint(39) B2..8.075

SHEETS, Galvanized Ingot Iron No. 10 flat
Ashland,Ky. (8) A10 ..5.525
Canton,O. R2 .....6.025

SHEETS, Galvannealed Steel
Canton,O. R2 .....5.825
Irvin,Pa. U5 .....5.825†
Kokomo,Ind. C16 ....5.925†
Niles,O. N12 .....5.825

† Based on 5c zinc

SHEETS, ZINCGRIP Steel
Butler,Pa. A10 .....5.275
Middletown,O. A10 ....5.275

SHEETS, ZINCGRIP Ingot Iron
Butler,Pa. A10 .....5.575
Middletown,O. A10 ....5.575

SHEETS, Electrogalvanized
Cleveland R2 (28) 6.125
Niles,O. R2 (28) 6.125
Weirton,W.Va. W6 ....5.975

SHEETS, ALUMINIZED
Butler,Pa. A10 .....8.625

SHEETS, Enameling Iron
Ashland,Ky.(8) A10 ..5.175
Cleveland R2 .....5.175
Gary,Ind. U5 .....5.175
GraniteCity,Ill. G4 ....5.375
Ind.Harbor,Ind. I-2 ..5.175
Irvin Pa. U5 .....5.175
Middletown,O. A10 ....5.175
Niles,O. N12 .....6.525
Youngstown Y1 .....5.175

BLUED STOCK, 29 ga.
Follansbee,W.Va. F4 .. 7.20
Follansbee(23) F4 .... 6.425
Yorkville,O. W10 .....7.20

SHEETS, Long Terne Steel (Commercial Quality)
BeechBott'm,W.Va.W10 5.675
Gary,Ind. U5 .....5.675
Mansfield,O. E6 .....5.675
Middletown,O. A10 ....5.675
Niles,O. N12 .....5.675
Weirton,W.Va. W6 ....5.675

SHEETS, Long Terne, Ingot Iron
Middletown,O. A10 ....6.075

SHEETS, Wall Casing
Fontana,Calif. K1 ....6.20

STRIP

STRIP, Hot-Rolled Carbon
Ala.City,Ala.(27) R2 ..3.925
Allenport,Pa. P7 .....3.925
Alton,Ill. L1 .....4.10
Ashland,Ky.(8) A10 ..3.925
Atlanta A11 .....4.125
Bessemer,Ala. T2 .....3.925
Birmingham C15 .....3.925
Bridgeport,Conn.(10)S15 3.95
Buffalo(27) R2 .....3.925
Carnegie,Pa. S18 .....4.425
Conshohocken,Pa. A3 ..4.05
Detroit M1 .....4.075
Ecorse,Mich. G5 .....4.075
Fairfield,Ala. T2 .....3.925
Fontana,Calif. K1 ....4.70
Gary,Ind. U5 .....3.925
Houston,Tex. S5 .....4.325
Ind.Harbor,Ind. I-2,Y1.3.925
Johnstown,Pa.(25) B2..3.925
KansasCity,Mo.(9) S5 .4.525
Lackawanna,N.Y.(25) B2.3.925
LosAngeles(25) B3 ....4.675
Milton,Pa. M18 .....3.925
Minnequa,Colo. C10 ...5.025
NewBritain(10) S15 ....4.15
N.Tonawanda,N.Y. B11.3.925
Pittsburg,Calif. C11 ..4.675
Portsmouth,O. P12 ....3.925
Riverdale,Ill. A1 .....3.925
SanFrancisco S7 .....5.10
Seattle(25) B3, P23 ..4.925
Seattle N14 .....4.925
Sharon,Pa. S3 .....3.925
So.Chicago,Ill. W14 ...3.925
So.SanFrancisco(25)B3 4.675
SparrowsPoint,Md. B2.3.925
Torrance,Calif. C11 ....4.675
Warren,O. R2 .....3.925
Weirton,W.Va. W6 ....3.925
Youngstown U5 .....3.925

STRIP, Hot-Rolled Alloy
Bridgeport,Conn.(10)S15 6.45
Carnegie,Pa. S18 .....6.40
Fontana,Calif. K1 .....7.80
Gary,Ind. U5 .....6.40
Houston,Tex. S5 .....6.80
KansasCity,Mo. S5 ....7.00
LosAngeles B3 .....7.60
NewBritn.,Conn.(10)S15 6.45
Sharon,Pa. S3 .....6.40
So.Chicago W14 .....6.40
Youngstown U5 .....6.40

STRIP, Hot-Rolled High-Strength Low-Alloy
Bessemer,Ala. T2 .....5.95
Conshohocken,Pa. A3 ..5.90
Ecorse,Mich. G5 .....6.10
Fairfield,Ala. T2 .....5.95
Fontana,Calif. K1 .....7.05
Gary,Ind. U5 .....5.95
Ind.Harbor,Ind. I-2 ....5.95
Ind.Harbor,Ind. Y1 ....6.45
Lackawanna,N.Y. B2 ..6.00
LosAngeles(25) B3 ....6.70
Seattle(25) B3, P23 ..6.95
Sharon,Pa. S3 .....5.95
So.SanFrancisco(25) B3.6.70
SparrowsPoint,Md. B2 ..6.00
Warren,O. R2 .....5.95
Weirton,W.Va. W6 ....5.95
Youngstown Y1 .....6.45
Youngstown U5 .....5.95

STRIP, Hot-Rolled Ingot Iron
Ashland,Ky.(8) A10 ..4.175
Warren,O. R2 .....4.525

STRIP, Cold-Rolled Carbon
Anderson,Ind. G5 .....5.45
Baltimore T6 ..... 5.60
Bridgeport,Conn.(10) S15.5.45
Cleveland A7, J5 ....5.45
Dearborn,Mich. D3 ....5.60
Detroit M1 .....5.60
Detroit D2, P20 .....5.65
Dover,O. G6 .....5.45
Ecorse,Mich. G5 .....5.60
Follansbee,W.Va. F4 ..5.45
Fontana,Calif. K1 .....7.35
FranklinPark,Ill. T6 ...5.70
Ind.Harbor,Ind. I-2 ....5.70
Indianapolis C8 .....5.60
Lackawanna,N.Y. B2 ..5.45
LosAngeles C1 .....7.50
Mattapan,Mass. T6 ....6.10
Middletown,O. A10 ....5.45
NewBedford Mass. R10..6.00
NewBritain(10) S15 ...5.45
NewCastle,Pa. B4, E5..5.45
NewHaven,Conn. A7 ...6.20
NewHaven,Conn. D2 ....5.90
Pawtucket,R.I. N8, R3..6.10
Pittsburgh J5 .....5.45
Riverdale,Ill. A1 .....5.70
Rome,N.Y.(32) R6 ....5.45
Sharon,Pa. S3 .....5.45
SparrowsPoint,Md. B2..5.45
Trenton,N.J. R5 .....7.00
Wall'ford,Conn. W2 ....5.90
Warren,O.(40) T5 ....5.45
Warren,O. B9, R2 ....5.45
Weirton,W.Va. W6 ....5.45
Worcester,Mass. A7 ....6.30
Youngstown C8, Y1 ....5.45

STRIP, Cold-Rolled Alloy Steel
Carnegie,Pa. S18 .....12.00
Cleveland A7 .....12.00
Dover,O. G6 .....12.00
Fontana,Calif. K1 ....13.65
Harrison,N.J. C18 ....12.00
Pawtucket,R.I.(11) NS.12.15
Pawtucket,R.I.(12) NS.12.45
Sharon,Pa. S3 .....12.00
Worcester,Mass. A7 ..12.30
Youngstown C8 .....12.00

STRIP, Cold-Rolled High-Strength Low-Alloy
Cleveland J5 .....7.80
Cleveland A7 .....8.15
Dearborn,Mich. D3 ....7.90
Dover,O. G6 .....8.00
Ecorse,Mich. G5 .....8.30
Lackawanna,N.Y. B2 ..8.15
Pittsburgh J5 .....7.80
Sharon,Pa. S3 .....7.65
SparrowsPoint,Md. B2..8.15
Warren,O. R2 .....7.60
Weirton,W.Va. W6 ....8.15
Youngstown Y1 .....8.30

STRIP, Cold-Rolled Ingot Iron
Warren,O. R2 .....6.05

STRIP, Electrogalvanized
Dover,O. G6 .....5.45
Warren,O. B9, T5 .....5.45
Weirton,W.Va. W6 ....5.45
Youngstown C8 .....5.70

TIGHT COOPERAGE HOOP
Atlanta A11 .....4.65
Riverdale,Ill. A1 .....4.50
Sharon,Pa. S3 .....4.35
Youngstown U5 .....4.35

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Co.
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke,Wickwire Spencer Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Div. H. K. Porter Co. Inc.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Products
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&FuelAssoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel&Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Kokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M16 Md. Fine & Special Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman&Scott

N2 National Supply Co.
N3 National Tube Div.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N12 Niles Rolling Mill Div.
N14 Nrthwst.Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg.Co.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P20 Prod. Steel Strip Corp.
P23 Pacific Steel Rolling

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RellanceDiv.,EatonMfg.
R9 Rome Mfg.Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S25 Stainless Welded Products
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.

T2 Tenn. Coal & Iron Div.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg.Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet&Tube

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	*5.60*	*7.95*	*8.90*	*10.85*	*13.15*
Bridgeport,Conn.(10) S15	5.45	7.65	8.60	10.55	12.85
Bristol,Conn. W1	...	...	8.90	10.85	....
Carnegie,Pa. S18	...	7.65	8.60	10.55	12.85
Cleveland A7	5.45	7.65	8.60	10.55	12.85
Cleveland,O. C7	...	8.00	8.60	10.55	12.85
Dearborn,Mich. D3	5.60	7.85	8.80	....	....
Detroit D2	5.65	7.85	8.80	10.55	....
Dover,O. G6	5.45	7.85	8.60	10.55	12.85
FranklinPark,Ill. T6	5.70	7.80	8.75	10.70	13.00
Harrison,N.J. C18	...	...	8.90	10.85	13.15
Indianapolis C8	...	7.80	8.60	10.55	....
Mattapan,Mass. T6	6.10	7.95	8.90	10.85	13.15
NewBritn.,Conn.(10) S15	5.75	7.65	8.60	10.55	12.85
NewCastle,Pa. B4	5.45	7.65	8.60	...	....
NewCastle,Pa. E5	5.45	8.00	8.60	10.55	12.85
NewHaven,Conn. D2	5.90	7.95	8.90	10.85	....
NewYork W3	...	7.95	8.90	10.85	13.15
Pawtucket,R.I.(11) N8	...	7.65	8.60	10.55	12.85
Pawtucket,R.I.(12) N8	6.10	7.95	8.90	10.85	13.15
Sharon,Pa. S3	5.45	7.65	8.60	10.55	12.85
Trenton,N.J. R5	...	7.95	8.90	10.85	13.15
Wallingford,Conn. W2	5.90	7.95	8.90	10.85	13.15
Warren,O. T5	5.45	7.65	8.60	10.55	12.85
Weirton,W.Va. W6	5.45	7.65	8.60	10.55	12.85
Worcester,Mass. A7	6.30	7.95	8.90	10.85	13.15
Worcester,Mass. T6	6.10	7.95	8.90	10.85	13.15
Youngstown C8	...	7.65	8.60	10.55	12.85
Spring Steel (Tempered)					
Buffalo W12	...	...	12.50	....	....
Bristol,Conn. W1	...	...	12.50	15.00	....
FranklinPark,Ill. T6	...	...	13.25	15.75	18.75
Harrison,N.J. C18	...	...	12.50	15.00	18.00
NewYork W3	...	...	12.50	15.00	18.00
Trenton,N.J. R5	...	...	12.50	15.00	18.00
Worcester,Mass. T6	...	...	12.50	15.00	18.00
Worcester,Mass. W12	...	...	12.50	....	....
Youngstown C8	...	...	12.85	15.35	18.35

SILICON STEEL

H.R. SHEETS (22 gage) (Cut Lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	...	...	8.75	9.75	10.65
Brackenridge,Pa. A4	...	...	8.75	9.75	10.65
IndianaHarbor,Ind. I-2	7.85	8.15	8.75	9.75	....
Mansfield,O. E6	7.85	8.15	8.75	9.75	10.65
Newport,Ky. N9	7.85	8.15	8.75	9.75	10.65
Niles,O. N12	7.85	8.15	8.75	9.75	....
Vandergrift,Pa. U5	...	8.15	8.75	9.75	10.65
Warren,O. R2	7.85	8.15	8.75	9.75	....
Zanesville, O. A10	...	8.15	8.75	9.75	10.65

C.R. COILS & CUT LENGTHS, (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
GraniteCity,Ill. G4	8.25*	8.60*	9.20*	10.20*	....
IndianaHarbor,Ind. I-2	8.05	8.40*	9.00*	....	....
Vandergrift,Pa. U5	8.05*	8.90	9.50	10.50	11.40
Warren,O. R2	8.05†	8.90	9.50	10.50	11.40

H.R. SHEETS (22 Gage) (Cut Lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	11.60	12.15	12.65	13.65
Brackenridge,Pa. A4	11.60	....	....	....
Newport,Ky. N9	11.60	....	....	....
Vandergrift,Pa. U5	11.60	12.15	12.65	13.65
Zanesville,O. A10	11.60	12.15	12.65	13.65

C.R. COILS & CUT LENGTHS (22 Ga.)	T-100	T-90	T-80	T-73	T-72
Butler,Pa. A10	....	....	16.25	16.75	....
Vandergrift,Pa. U5	13.65	14.65	16.25	16.75	12.35‡
Warren,O. R2	....	....	....	....	12.35‡

* Semiprocessed. † Fully processed only. ‡ Coils annealed; semiprocessed ½c lower.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.40	$7.65	$8.05
Fairfield,Ala. T2	7.50	7.75	8.15
Fairless,Pa. U5	7.50	7.75	8.15
Gary,Ind. U5	7.40	7.65	8.05
GraniteCity,Ill. G4	7.60	7.85	8.25
IndianaHarbor,Ind. I-2, Y1	7.40	7.65	8.05
Irvin,Pa. U5	7.40	7.65	8.05
Niles,O. R2	7.40	7.65	8.05
Pittsburg,Calif. C11	8.15	8.40	8.80
SparrowsPoint,Md. B2	7.50	7.75	8.15
Weirton,W.Va. W6	7.40	7.65	8.05
Yorkville,O. W10	7.40	7.65	8.05

TIN PLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$8.70	$8.95
Fairfield,Ala. T2	8.80	9.05
Fairless,Pa. U5	8.80	9.05
Gary,Ind. U5	8.70	8.95
Ind.Har. I-2, Y1	8.70	8.95
Irvin,Pa. U5	8.70	8.95
Pitts.,Cal. C11	9.45	9.70
Sp.Pt.,Md. B2	8.80	9.05
Warren,O. R2	8.70	8.95
Weirton,W.Va. W6	8.70	8.95
Yorkville,O. W10	8.70	8.95

BLACK PLATE (Base Box)	lb
Aliquippa,Pa. J5	$6.50
Fairfield,Ala. T2	6.60
Fairless,Pa. U5	6.60
Gary,Ind. U5	6.50
GraniteCity,Ill. G4	6.70
Ind.Harbor,Ind. I-2, Y1	6.50
Irvin,Pa. U5	6.50
Niles,O. R2	6.50
Pittsburg,Calif. C11	7.25
SparrowsPoint,Md. B2	6.60
Warren,O. R2	6.50
Weirton,W.Va. W6	6.50
Yorkville,O. W10	6.50

HOLLOWARE ENAMELING Black Plate (29 gage)	
Follansbee,W.Va. F4	6.10
Gary,Ind. U5	6.10
GraniteCity,Ill. G4	6.30
Ind.Harbor,Ind. Y1	6.10
Irvin,Pa. U5	6.10
Yorkville,O. W10	6.10

MANUFACTURING TERNES (Special Coated)	
Fairfield,Ala. T2	$7.85
Gary,Ind. U5	7.75
Irvin,Pa. U5	7.75
Yorkville,O. W10	7.75

MANUFACTURING TERNES, 8 lb (Commercial Quality)	
Gary,Ind. U5	$9.75
Yorkville,O. W10	9.75

MANUFACTURING TERNES, LT. Coated, 6 lb	
Yorkville,O. W10	$8.65

ROOFING SHORT TERNES (8 lb Coated)	
Gary,Ind. U5	9.75

WIRE

WIRE, Manufacturers Bright, Low Carbon	
AlabamaCity,Ala. R2	5.525
Aliquippa,Pa. J5	5.525
Alton,Ill. L1	5.70
Atlanta A11	5.725
Bartonville,Ill. K4	5.625
Buffalo W12	5.525
Chicago W13	5.525
Cleveland A7, C20, R2	5.525
Crawfordsville,Ind. M8	5.625
Donora,Pa. A7	5.525
Duluth,Minn. A7	5.525
Fairfield,Ala. T2	5.525
Fostoria,O. (24) S1	5.75
Houston S5	5.925
Jacksonville,Fla. M8	6.05
Johnstown,Pa. B2	5.525
Joliet,Ill. A7	5.525
KansasCity,Mo. S5	6.125
Kokomo,Ind. C16	5.625
LosAngeles B3	6.475
Minnequa,Colo. C10	5.775
Monessen,Pa. P7	5.525
No.Tonawanda B11	5.525
Palmer,Mass. W12	5.825
Pittsburg,Calif. C11	6.475
Portsmouth,O. P12	5.525
Rankin,Pa. A7	5.525
So.Chicago,Ill. R2	5.525
So.SanFrancisco C10	6.475
SparrowsPoint,Md. B2	5.625
Sterling,Ill.(1) N15	5.525
Struthers,O. Y1	5.525
Waukegan,Ill. A7	5.525
Worcester,Mass. A7	5.825

WIRE, MB Spring, High Carbon	
Aliquippa,Pa. J5	6.925
Alton,Ill. L1	7.10
Bartonville,Ill. K4	7.025
Buffalo W12	6.925
Cleveland A7	6.925
Donora,Pa. A7	6.925
Duluth,Minn. A7	6.925
Fostoria,O. S1	6.925
Johnstown,Pa. B2	6.925
LosAngeles B3	7.875
Millbury,Mass.(12) N6	7.225
Minnequa,Colo. C10	7.175
Monessen,Pa. P7, P16	6.925
Muncie,Ind. I-7	7.125
Palmer,Mass. W12	7.225
Pittsburg,Calif. C11	7.875
Portsmouth,O. P12	6.925
Roebling,N.J. R5	7.225
So.Chicago,Ill. R2	6.925
So.SanFran. C10	7.875
SparrowsPt.,Md. B2	7.025
Struthers,O. Y1	6.925
Trenton,N.J. A7	7.225
Waukegan,Ill. A7	6.925
Worcester A7, J4	7.225
Worcester T6, W12	7.225

WIRE, Upholstery Spring	
Aliquippa,Pa. J5	6.625
Alton,Ill. L1	6.80
Buffalo W12	6.625
Cleveland A7	6.625
Donora,Pa. A7	6.625
Duluth,Minn. A7	6.625
Johnstown,Pa. B2	6.625
LosAngeles B3	7.575
Minnequa,Colo. C10	6.80
Monessen,Pa. P7, P16	6.625
NewHaven,Conn. A7	6.925
Palmer,Mass. W12	6.925
Pittsburg,Calif. C11	7.575
Portsmouth,O. P12	6.625
Roebling,N.J. R5	6.925
So.Chicago,Ill. R2	6.625
So.SanFrancisco C10	7.575
SparrowsPoint,Md. B2	6.725
Trenton,N.J. A7	6.925
Waukegan,Ill. A7	6.625
Worcester,Mass. A7	6.925

WIRE, Fine & Weaving (8"Coils)	
Alton,Ill. L1	10.75
Bartonville,Ill. K4	10.65
Buffalo W12	10.55
Chicago W13	10.55
Cleveland A7	10.55
Crawfordsville,Ind. M8	10.65
Fostoria,O. S1	10.55
Jacksonville,Fla. M8	11.08
Johnstown,Pa. B2	10.55
Kokomo,Ind. C16	10.55
Minnequa,Colo. C10	10.30
Monessen,Pa. P16	10.55
Muncie,Ind. I-7	10.75
Palmer,Mass. W12	10.85
Roebling,N.J. R5	10.85
So.SanFrancisco C10	10.90
Waukegan,Ill. A7	10.55
Worcester,Mass. A7,T6	10.85

WIRE, Galv'd ACSR for Cores	
Bartonville,Ill. K4	9.50
Buffalo W12	9.50
Johnstown,Pa. B2	9.50
Minnequa,Colo. C10	9.625
Monessen,Pa. P16	9.50
Muncie,Ind. I-7	9.70
Portsmouth,O. D2	9.50
Roebling,N.J. R5	9.80
SparrowsPt.,Md. B2	9.60

ROPE WIRE (A)	
Alton,Ill. L1	9.45
Bartonville,Ill. K4	9.35
Buffalo W12	9.35
Fostoria,O. S1	9.35
Johnstown,Pa. B2	9.35
Monessen,Pa. P7, P16	9.35
Muncie,Ind. I-7	9.55
Palmer,Mass. W12	9.65
Portsmouth,O. P12	9.35
Roebling,N.J. R5	9.65
SparrowsPt. B2	9.45
Struthers,O. Y1	9.35
Worcester J4, T6	9.65

(A) Plow and Mild Plow; add 0.25c for improved plow.

WIRE, Tire Bead	
Alton,Ill. L1	12.75
Bartonville,Ill. K4	12.65
Monessen,Pa. P16	12.55
Roebling,N.J. R5	12.85

WIRE, Cold-Rolled Flat	
Anderson,Ind. G6	7.45
Baltimore T6	*7.75*
Buffalo W12	7.45
Cleveland A7	7.45
Crawfordsville,Ind. M8	7.55
Dover,O. G6	7.45
Fostoria,O. S1	7.45
Kokomo,Ind. C16	7.55
FranklinPark,Ill. T6	7.60
Massillon,O. R8	7.45
Monessen,Pa. P7, P16	7.45
Pawtkt.,R.I.(12) N8	7.75
Trenton,N.J. R5	7.75
Worcester A7, T6, W12	7.75

WIRE, Merchant Quality (6 to 8 gage)	An'ld. Galv.
Ala.City R2	6.675 7.075**
Aliquippa J5	6.675 7.20*
Atlanta A11	6.775 7.30
Bartonville(48)K4	6.775 7.30
Buffalo W12	6.675 7.075†
Cleveland A7	6.675 ....
Crawfordsville M8	6.775 7.30
Donora,Pa. A7	6.675 7.075†
Duluth,Minn. A7	6.675 7.075†
Fairfield T2	6.675 7.075†
Houston,Tex. S5	7.075 7.475
Jacksonville,Fla. M8	7.20 7.73
JohnstownB2(48)	6.675 7.225*
Joliet,Ill. A7	6.675 7.075†
KansasCity,Mo.S5	7.275 7.675
Kokomo C16	6.775 7.175†
LosAngeles B3	7.625 ....
Minnequa C10	6.925 7.325**
Monessen P7(48)	6.675 7.225
Palmer W12	6.975 7.375†
Pitts.,Calif. C11	7.625 8.025†
Portsmouth,O.P12	6.675 ....
Rankin A7	6.675 7.075†
So.Chi'go R2	6.675 7.075**
S.S.Frn.(48)C10	7.625 8.025**
Spar'wsPt.B2(48)	6.775 7.325*
Steri'g(1)(48)N15	6.675 7.20
Struthers,O. Y1	6.675 7.175
Worcester A7	6.975 ....

* Based on 10c zinc; † 5c zinc; ** Subject to zinc equalization extras.

WOVEN FENCE, 9-15½ Ga.	Col.
Ala.City,Ala. R2	140**
Ala.City, 17 ga. R2	235**
Ala.City, 18 ga. R2	245**
Aliq'ppa,Pa.9-14½ga.J5	143*
Atlanta A11	145
Bartonville,Ill. K4	*145*
Crawfordsville,Ind. M8	145
Donora,Pa. A7	140†
Duluth,Minn. A7	140†
Fairfield,Ala. T2	140†
Houston,Tex. S5	148
Johnstown,Pa. B2	143
Johnstown 17 ga.,6"B2	234
Johnstown 4" B2	237
Joliet,Ill. A7	140†
KansasCity,Mo. S5	152
Kokomo,Ind. C16	142†
Minnequa,Colo. C10	148**
Monessen,Pa. 9 ga. P7	145
Pittsburg,Calif. C11	163†
Rankin,Pa. A7	140†
So.Chicago,Ill. R2	140**
Sterling,Ill. (1) N15	143

† Based on 5c zinc; * 11c zinc; ** Subject to zinc equalization extras.

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	149
Atlanta A11	151
Bartonville,Ill. K4	151
Crawfordsville,Ind. M8	151
Donora,Pa. A7	149
Duluth,Minn. A7	149
Fairfield,Ala. T2	149
Joliet,Ill. A7	149
KansasCity,Mo. S5	161
Kokomo,Ind. C16	151
Minnequa,Colo. C10	154
Pittsburg,Calif. C11	173
So.Chicago,Ill. R2	149
So.SanFran.,Calif. C10	173
SparrowsPoint,Md. B2	151
Sterling,Ill.(1) N15	149

WIRE, Barbed	Col.
AlabamaCity R2	153**
Aliquippa J5	150*
Atlanta A11	158
Bartonville,Ill. K4	*158*
Crawfordsville,Ind. M8	158
Donora,Pa. A7	153†
Duluth,Minn. A7	153†
Fairfield,Ala. T2	153†
Houston,Tex. S5	161
Johnstown,Pa. B2	156*
Joliet,Ill. A7	153†
KansasCity,Mo. S5	165
Kokomo,Ind. C16	155†
Minnequa,Colo. C10	156**
Monessen,Pa. P7	157
Pittsburg,Calif. C11	173†
Rankin,Pa. A7	153†
So.Chicago,Ill. R2	153**
S.SanFrancisco C10	176**
SparrowsPoint,Md. B2	158*
Sterling,Ill. (1) N15	156

† Based on 5c zinc; * 11c zinc; ** Subject to zinc equalization extras.

WIRE (16 gage)	Stone	An'ld. Galv. Stone
Ala.City R2	12.50	14.05**
Aliquippa J5	12.50	14.30*
Bartonville K4	12.60	14.40
Buffalo W12	12.50	....
Cleveland A7	12.50	....
CrawfordsvilleM8	12.50	14.30
Fostoria,O. S1	12.60	14.15
Johnstown B2	12.50	14.35*
Kokomo C16	12.60	14.15†
Minnequa C10	12.75	14.45**
Palmer,Mas.W12	12.50	14.05†
Pitts.,Calif. C11	12.85	14.40†
SparrowsPt. B2	12.60	14.45*
Sterling(1) N15	12.50	14.30
Waukegan A7	12.50	14.05†
Worcester A7	12.80	....

* Based on 11c zinc; † 5c zinc; ** Subject to zinc equalization extras.

NAILS, Stock To dealers & mfrs. (7)	Col.
Alabama City,Ala. R2	131
Aliquippa,Pa. J5	131
Atlanta A11	133
Bartonville,Ill. K4	133
Chicago,Ill. W13	131
Cleveland A9	137
Crawfordsville,Ind. M8	133
Donora,Pa. A7	131
Duluth,Minn. A7	131
Fairfield,Ala. T2	131
Galveston,Tex. D7	139
Houston,Tex. S5	139
Johnstown,Pa. B2	131
Joliet,Ill. A7	131
KansasCity,Mo. S5	143
Kokomo,Ind. C16	133
Minnequa,Colo. C10	136
Monessen,Pa. P7	131
Pittsburg,Calif. C11	150
Rankin,Pa. A7	131
So.Chicago,Ill. R2	131
SparrowsPt.,Md. B2	133
Sterling,Ill. (1) N15	131
Worcester,Mass. A7	137

NAILS, CUT (100 lb keg) To dealers (33)	
Conshohocken,Pa. A3	$8.00
Wheeling,W.Va. W10	8.00

STAPLES, Polished Stock To dealers & mfrs. (7)	Col.
AlabamaCity,Ala. R2	133
Aliquippa,Pa. J5	133
Atlanta A11	135
Bartonville,Ill. K4	135
Crawfordsville,Ind. M8	135
Donora,Pa. A7	133
Duluth,Minn. A7	133
Fairfield,Ala. T2	133
Johnstown,Pa. B2	133
Joliet,Ill. A7	133
Kokomo,Ind. C16	135
Minnequa,Colo. C10	138
Monessen,Pa. P7	133
Pittsburg,Calif. C11	152
Rankin,Pa. A7	133
So.Chicago,Ill. R2	133
SparrowsPt.,Md. B2	135
Sterling,Ill. (1) N15	133
Worcester,Mass. A7	139

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2 I-2	145
Duluth,Minn. A7 (49)	145
Franklin,Pa. F5	145
Johnstown,Pa. B2	145
Marion,O. P11	145
Minnequa,Colo. C10	150
Moline,Ill. R2	145
So.Chicago,Ill. R2	145
Tonawanda,N.Y. B12	145
Williamsport,Pa. S19	148

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv
Aliquippa, Pa. J5 (‡)	15.75	list	19.75	2.5	22.25	5	23.75	6.5	23.75	6.5	23	5.75	25.5	8.25
Ambridge, Pa. N2 (†)	15.75	...	19.75	...	22.25	...	23.75	...	23.75	...	23	...	25.5	....
Lorain, O. N3 (*)	15.75	4.5	19.75	5.5	22.25	8	23.75	9.5	23.75	9.5	23	8.75	25.5	11.25
Youngstown Y1 (††)	15.75	list	19.75	2.5	22.25	5	23.75	6.5	23.75	6.5	23	5.75	25.5	8.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2 (**)	15.75	1.5	19.75	3.5	22.25	6.0	23.75	7.5	23.75	7.5	23	7.5	25.5	6.75

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	¼		⅜		⅝		½		¾		1		1¼		1½	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c		27.5c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28		2.73	
	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv
Aliquippa, Pa. J5 (‡)	....	....	....	....	....	....	26.25	10	29.25	14	31.75	17.5	34.25	18.5	34.75	19.5
Alton, Ill. L1 (§)	....	....	....	....	....	....	24.25	9	27.25	13	29.75	16.5	32.25	17.5	32.75	18.25
Benwood, W. Va. W10(††)	25.5	+0.25	17.75	+5.5	10.25	+10	26.25	11	29.25	15	31.75	18.5	34.25	19.5	34.75	20.25
Butler, Pa. F6	26.5	—1.75	19.5	+2.75	12.5	+6.25	....	....	....	....	....	....	....	....	....	....
Etna, Pa. N2 (†)	....	....	....	....	....	....	26.25	7	29.25	11	31.75	14.5	34.25	16.25	34.75	17.25
Fairless, Pa. N3	....	....	....	....	....	....	24.25	..	27.25	..	29.75	...	32.25	....	32.75	....
Fontana, Calif. K1 (§)	....	....	....	....	....	....	13.25	+3	16.25	1	18.75	4.5	21.25	5.5	21.75	6.5
Ind. Harbor Y1 (††)	....	....	....	....	....	....	25.25	9	28.25	13	30.75	16.5	33.25	17.5	33.75	18.5
Lorain, O. N3 (*)	....	....	....	....	....	....	26.25	16	29.25	20	31.75	23.5	34.25	23	34.75	24
Sharon, Pa. S4 (‡)	26.5	—0.25	19.50	+4.25	12.5	+8.5	....	....	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	26.25	11	29.25	15	31.75	18.5	34.25	19.25	34.75	20.25
Sparrows Pt., Md. B2 (§)	24.5	+1.75	17.5	+6.25	10.5	+10.5	24.25	8	27.25	12	29.75	15.5	32.25	16.5	32.75	17.5
Youngstown R2 (**)	....	....	....	....	....	....	26.25	12	29.25	16	31.75	19.5	34.25	20.0	34.75	21.0
Youngstown Y1 (††)	....	....	....	....	....	....	26.25	10	29.25	14	31.75	17.5	34.25	18.5	34.75	19.5
Wheatland, Pa. W9 (§)	24.5	+1.75	17.5	+6.25	10.5	+10.5	26.25	10	29.25	14	31.75	17.5	34.25	18.5	34.75	19.5

Size—Inches	2		2½		3		3½		4	
List Per Ft	37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89	
	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv
Aliquippa, Pa. J5 (‡)	35.25	20	36.75	20	36.75	20	....	....	....	....
Alton, Ill. L1 (§)	33.25	18.75	34.75	18	34.75	18	....	....	....	....
Benwood, W. Va. W10(††)	35.25	20.75	36.75	20.5	36.75	20.5	27.75	11	27.75	11
Etna, Pa. N2 (†)	35.25	17.25	36.75	18.5	36.75	18.5	27.75	9	27.75	9
Fairless, Pa. N3	33.25	....	34.75	....	34.75	....	25.75	....	25.75	....
Fontana, Calif. K1 (§)	22.25	7	23.75	7	23.75	7	....	....	....	....
Ind. Harbor, Ind. Y1 (††)	34.25	19	35.75	19	35.75	19	....	....	....	....
Lorain, O. N3 (*)	35.25	24.5	36.75	23	36.75	23	....	....	....	....
Sharon, Pa. M6	35.25	20.75	36.75	20.5	36.75	20.5	....	....	....	....
Sparrows Pt., Md. B2 (§)	32.25	18	34.75	18	34.75	18	25.75	8.5	25.75	8.5
Youngstown R2 (**)	35.25	21.5	36.75	21.0	36.75	21.0	27.75	11.5	27.75	11.5
Youngstown Y1 (††)	35.25	20	36.75	20	36.75	20	....	....	....	....
Wheatland, Pa. W9 (§)	35.25	20	36.75	20	36.75	20	....	....	....	....

Galvanized pipe discounts based on zinc price of: (†), 14c; (‡), 11c to under 12c; (*), 5c; (§), 10c to under 11c; (††), 10.50c-11.50c; (**), 9.50c; with discounts adjusted on price of zinc at time of shipment.

BOILER TUBES

Net base c.l. prices, dollar per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	19.02	18.44
1¼	13	....	22.53	18.12
1½	13	20.65	24.91	20.01
1¾	13	24.40	29.43	23.66
2	13	27.34	32.98	26.51
2¼	13	30.80	37.15	29.86
2½	12	33.43	40.32	32.41
2⅞	12	36.82	44.41	35.70
2¾	12	39.87	48.09	38.66
3	12	42.52	51.28	41.23

RAILWAY MATERIALS

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	4.325	4.225	4.275	5.20
Ensley,Ala. T2	4.325	4.225	....	5.20
Fairfield,Ala. T2	....	....	....	5.20
Gary, Ind. U5	4.325	4.225	4.275	....
Huntington,W.Va. W7	....	....	....	5.20
IndianaHarbor,Ind. I-2	4.325	4.225	4.275	....
Johnstown,Pa. B2	....	....	....	...(16)5.20
Lackawanna,N.Y. B2	4.325	4.225	....	5.20
Minnequa,Colo. C10	4.325	4.225	....	5.70
Steelton,Pa. B2	4.325	4.225	....	....
Williamsport,Pa. S19	....	....	....	5.20

TIE PLATES

Fairfield,Ala. T2	5.125
Gary,Ind. U5	5.125
Ind.Harbor,Ind. I-2	5.125
Lackawanna,N.Y. B2	5.125
Minnequa,Colo. C10	5.125
Pittsburg,Calif. C11	5.275
Seattle B3	5.275
Steelton,Pa. B2	5.125
Torrance,Calif. C11	5.275

TRACK BOLTS (20) Treated

Cleveland R2	11.00
KansasCity,Mo. S5	11.00
Lebanon,Pa. B2	11.00
Minnequa,Colo. C10	11.00
Pittsburgh O3, P14	11.00
Seattle,Wash. B3	11.50

JOINT BARS

Bessemer,Pa. U5	5.275
Fairfield,Ala. T2	5.275
Ind.Harbor,Ind. I-2	5.275
Joliet,Ill. U5	5.275
Lackawanna,N.Y. B2	5.275
Minnequa,Colo. C10	5.275
Steelton,Pa. B2	5.275

AXLES

Ind.Harbor,Ind. S13	6.50
Johnstown,Pa. B2	6.50

STANDARD TRACK SPIKES

Fairfield,Ala. T2	7.05
Ind.Harbor,Ind. I-2, Y1	7.05
KansasCity,Mo. S5	7.30
Lebanon,Pa. B2	7.05
Minnequa,Colo. C10	7.05
Pittsburgh J5	7.05
Seattle B3	7.55
So.Chicago,Ill. R2	7.05
Struthers,O. Y1	7.05
Youngstown R2	7.05

RIVETS

F.o.b. Cleveland, and/or freight equalized with Pittsburgh, f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.

Structural ½-in., larger 8.90c
⅞-in. under ..... 26.5 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ..... List

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants, per cent off list for less than case lots to consumers)

6 in. and shorter:	
½-in. & smaller diam.	4
⅝-in. & ⅝-in.	5
¾-in. and larger	3
Longer than 6 in.:	
All diams.	+4
Lag bolts, all diams.:	
6 in. and shorter	12
Over 6 in. long	8
Ribbed Necked Carriage	5
Blank	25
Plow	25
Step, Elevator, Tap and Sleigh Shoe	12
Tire Bolts	List
Boiler & Fitting-Up Bolts	23

NUTS

H.P. & C.P., regular & heavy:	
Square, all sizes	58
H.P., Hex, regular & heavy:	
¾" and smaller	58
⅞" to 1⅛", inclusive	60
1¼" to 1⅝", inclusive	62
1⅝" and larger	58
C.P. Hex, regular & heavy:	
All sizes	58
Hot Galv. Nuts (all types):	
¾" and smaller	40
⅞" to 1½", inclusive,	43
Finished Hex Nuts:	
New standard, all sizes	58
Semifinished & Slotted Hex.:	
Regular and heavy, all sizes	58

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter	34
1 in. and smaller diam. x over 6 in.	20

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller	34
¼ in. diam & larger	14
N.F. thread, all diams.	8

STEEL STOVE BOLTS

(F.o.b. plant, per cent off list in packages)

Plain finish	47.5 x 10
Plated finishes	30 x 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:	
⅝-in. & smaller	38
¾-in. through 1 in.	22
Longer than 6 in.:	
⅝-in. and smaller	20
¾-in. through 1 in.	7

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted)

Sponge Iron:	Cents
98+% Fe, annealed	18.00
Unannealed	
Minus 100 mesh	14.50
Minus 35 mesh	10.50
Minus 20 mesh	10.00
Swedish, c.i.f. N.Y., c.l., in bags	11.25
Domestic (Swedish), f.o.b. Riverton, N. J., in bags	11.25
Electrolytic Iron:	
Melting stock, 99.91% Fe, irregular fragments of ⅛ in. x 1.3 in.	23.00
Annealed, 99.5% Fe	42.50
Unannealed (99+% Fe)	36.50
Unannealed (99+% Fe) (minus 325 mesh)	53.50
Powder Flakes (minus 16, plus 100 mesh)	31.00
Carbonyl Iron:	
97.9-99.8% size 5 to 10 microns	83.00-148.00
Aluminum:	
Atomized, 500 lb drums, frgt. allowed:	
Carlots	31.00
Ton lots	34.00
Antimony, 500 lb lots	32.00*
Brass, ¼-ton lots	28.75-37.50†
Bronze, ¼-ton lots	50.00-60.00‡
Copper:	
Electrolytic	13.50*
Reduced	13.50*
Lead	7.50*
Magnesium	54.00-56.00
Manganese:	
Minus 35 mesh	61.00
Minus 100 mesh	67.00
Minus 200 mesh	72.00
Nickel, unannealed	89.50
Nickel-Silver, ¼-ton lots	44.00-49.00‡
Nickel-Silver, ¼-ton lots	46.75**
Phosphor-Bronze, ¼-ton lots	58.50
Silicon	43.50
Solder	8.50*
Stainless Steel, 302	91.00
Tin	14.50*
Zinc, ¼-ton lots	15.00-28.75‡
Tungsten	Dollars
Melting grade, 99% 60 to 200 mesh:	
1000 lb and over	4.95
Less than 1000 lb	5.10
Chromium, electrolytic 99.9% Cr min.	3.50

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Sn. **64% Cu, 18% Zn, 18% Sn.

Footnotes

(1) Chicago base.
(2) Angles, flat, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛" to 1 7/16"; 1 7/16" to 1 15/16" 4.58c; 1 15/16" to 7 5/16" 4.95c.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass. base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25c off for untreated.
(21) New Haven, Conn., base.
(22) Del. San Francisco Bay area.
(23) 20 Ga. 38" wide.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing mill lengths, to fabricators; to consumers, 5.40c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c for carbon and 0.35c for H.S.-L.A.
(31) Base; deld. within mill county.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 gage & lighter; 60" & narrower.
(38) 14 gage & lighter; 48" and narrower.
(39) 48" and narrower.
(40) Lighter than 0.038"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(48) 6-7 gage.
(49) T-post; deduct 2 cols for U-post.

STAINLESS STEEL MILL PRICES

(Representative prices cents per pound; subject to current lists of extras)

AISI Type	Rerolling Ingots	Rerolling Slabs, Billets	Forging Billets	Seamless Tube Billets	Shapes; H.R. & C.F. Bars; H.R. Strip	Wire	Plates	Sheets	C.R. Strip; Flat Wire
301	16.25	20.50	29.50	34.25	29.75	35.25	37.25	46.25	38.25
302	17.25	22.75	29.75	34.50	32.00	35.50	37.50	46.50	41.50
302B	18.50	24.50	30.50	34.50	35.00	35.50	37.50	48.75	44.75
303	18.75	24.75	32.25	37.25	36.75	38.25	39.75	48.75	45.50
304	18.25	23.75	31.00	36.00	34.25	37.25	39.75	48.75	43.75
304L	....	....	36.75	....	....	42.75	45.25	54.25	49.00
306	19.50	25.50	....	36.25	37.00	37.50	42.00	51.75	46.75
308	19.75	26.25	35.25	40.75	38.00	42.00	46.00	55.25	48.00
309	26.50	34.75	43.25	49.25	49.25	50.50	53.75	63.50	62.00
309S	28.50	37.50	47.50	54.50	54.00	55.50	59.00	68.50	65.50
310	33.00	43.25	56.75	66.25	67.50	67.50	69.00	72.25	78.75
314	....	....	....	....	....	....	....	69.00	74.50	....
316	28.00	36.25	46.75	54.50	55.00	55.50	59.00	64.50	66.50
316L	....	....	52.50	....	....	61.00	64.25	70.00	72.00
317	33.00	43.50	58.25	66.75	67.50	68.25	70.75	77.00	79.25
318	33.50	44.00	55.25	64.50	66.25	65.50	68.75	78.00	80.25
321	22.75	29.50	35.25	40.75	42.00	42.00	46.00	55.50	54.50
330	....	....	....	58.00	....	....	68.50	70.00	73.75	77.75
347	24.50	32.25	39.50	45.75	46.50	46.75	51.25	60.75	59.25
403	....	....	....	27.00	30.75	....	32.00	34.25	44.00	41.25
405	16.50	21.75	25.25	29.25	30.50	30.25	31.75	42.50	39.75
410	14.00	18.25	24.00	27.75	26.25	28.75	30.00	40.75	34.25
416	....	....	....	24.50	28.25	....	29.25	30.50	41.25	41.25
420	22.00	28.50	29.25	34.00	35.50	35.00	36.50	49.25	52.75
430	14.25	18.50	24.50	28.25	27.00	29.25	30.50	43.50	34.75
430F	....	18.75	25.00	28.75	....	29.75	31.00	44.00	44.00
431	14.50	28.50	25.00	28.25	27.50	29.25	30.50	44.00	35.25
440A,B,C	....	28.50	29.25	34.00	....	35.00	36.50	49.25	52.75
442	....	....	....	28.00	....	....	30.50	35.25	48.25	47.75
446	....	....	....	33.75	38.25	53.00	39.50	40.75	59.75	71.00
501	....	....	....	14.00	14.50	21.25	16.00	18.25	30.50	29.00
502	....	....	....	15.25	16.00	22.25	17.00	20.00	31.75	30.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Shenango Agaloy Tube Co.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

CLAD STEEL

Cladding Stainless	Plates: Carbon Base 10%	Plates: Carbon Base 20%	Sheets: Carbon Base 20%	Sheets: Copper Base Both Sides
302	....	31.00	31.00	77.00
304	27.60	32.50-32.70	32.50	77.00
310	36.50	41.00	.....	144.00
316	32.60	37.70-42.75	42.75	....
318	37.00	42.20	.....	....
321	29.80	34.40-37.00	37.00	111.00
347	30.40	35.50-40.50	40.50	130.00
405	23.40	30 60	.....	....
410	22.90	30.10	.....	....
430	22.90	30.10	.....	....
Inconel	41.23	54.18	.....	165.00
Nickel	37.50	50.90	.....	....
Monel	38.90	51.80	.....	....
Copper*	....	.....	46.00	....

	Strip, Carbon Base: Cold-Rolled 10%	Cold-Rolled Both Sides	Hot-Rolled 10%	Hot-Rolled Both Sides
Copper*	27.85	35.85	24.00	32.25

* Deoxidized. Production points: Stainless sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18. Production point for copper-base sheets is Carnegie, Pa. A13.

TOOL STEEL

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.25	5% Cr Hot Work	0.39
Extra Carbon	0.30	W-Cr Hot Work	0.41
Special Carbon	0.355	V-Cr Hot Work	0.42-.43
Oil Hardening	0.37-.390	Hi-Carbon-Cr	0.665-.70

Grade by Analysis (%) W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	3.875
18.25	4.25	1	4.75	...	2.160-2.320
18	4	2	9	...	2.515
18	4	2	....	...	1.640
18	4	1	....	...	1.480
13.5	4	3	....	...	1.735
6.4	4.5	1.9	....	5	1.005-1.055
6	4	3	....	6	1.240
2	1.4	1.2	....	...	0.495
1.5	4	1	....	8.5	0.865-0.895

Tool Steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, L3, M14, S8, U4, V2 and V3.

PIG IRON

Gross Ton

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
AlabamaCity R2	52.38	52.88	....	....
Birmingham R2	52.38	52.88	....	....
Birmingham U6	....	52.88	....	....
Woodward,Ala. W15	52.38	52.88	56.50†	....
Cincinnati, del.	....	60.43	....	....
Buffalo District				
Buffalo R2, H1	56.00	56.50	57.00	....
Tonawanda,N.Y. W12	56.00	56.50	57.00	....
No. Tonawanda,N.Y. T9	....	56.50	57.00	....
Boston, del.	66.65	67.15	67.65	....
Rochester,N.Y., del.	59.02	59.52	60.02	....
Syracuse,N.Y., del.	60.12	60.62	61.12	....
Chicago District				
Chicago I-3	56.00	56.50	56.50	57.00
Gary,Ind. U5	56.00	....	56.50	....
IndianaHarbor,Ind. I-2	56.00	....	56.50	....
So.Chicago,Ill. W14, Y1	56.00	56.50	56.50	....
So.Chicago,Ill. U5	56.00	....	56.50	57.00
Milwaukee, del.	58.17	58.67	58.67	59.17
Muskegon,Mich., del.	....	62.80	62.80	....
Cleveland District				
Cleveland A7	56.00	56.50	56.50	57.00
Cleveland R2	56.00	56.50	56.50	....
Akron,O., del. from Cleve.	58.75	59.25	59.25	59.75
Lorain,O. N3	56.00	....	....	57.00
Mid-Atlantic District				
Bethlehem,Pa. B2	58.00	58.50	59.00	59.50
NewYork, del.	....	62.28	62.78	....
Newark, del.	61.02	61.52	62.02	62.52
Birdsboro, Pa. B10	58.00	58.50	....	....
Steelton,Pa. B2	58.00	58.50	59.00	59.50
Swedeland,Pa. A3	58.00	58.50	59.00	59.50
Philadelphia, del.	59.66	60.16	60.66	61.16
Troy,N.Y. R2	58.00	58.50	59.00	....
Pittsburgh District				
NevilleIsland,Pa. P6	56.00	56.50	56.50	57.00
Pittsburgh (N&S sides), Ambridge, Aliquippa, del.	57.37	57.87	57.87	58.37
McKeesRocks, del.	57.04	57.54	57.54	58.04
Lawrenceville,Homestead, Wilmerding,Monaca, del.	57.66	58.16	58.16	58.66
Verona,Trafford, del.	58.19	58.69	58.69	59.19
Brackenridge, del.	58.45	58.95	58.95	59.45
Bessemer, Pa. U5	56.00	....	56.50	57.00
Clairton,Rankin,So.Duquesne,Pa. U5	56.00	....	....	....
McKeesport,Pa. N3	56.00	....	....	57.00
Midland,Pa. C18	56.00	....	....	....
Monessen,Pa. P7	56.00	....	....	....
Youngstown District				
Hubbard,O. Y1	....	....	56.50	....
Sharpsville,Pa. S6	56.00	56.50	56.50	57.00
Youngstown Y1	....	....	56.50	57.00
Youngstown U5	56.00	....	....	57.00
Mansfield,O., del.	60.90	....	61.40	61.90
Duluth I-3	56.00	56.50	56.50	57.00
Erie,Pa. I-3	56.00	56.50	56.50	57.00
Everett,Mass. E1	60.75	61.25	61.75	....
Fontana,Calif. K1	62.00	62.50	....	....
Geneva,Utah C11	56.00	56.50	....	....
GraniteCity,Ill. G4	57.90	58.40	58.90	....
Ironton,Utah C11	56.00	56.50	....	....
LoneStar,Texas L6	52.00	52.50*	52.50	....
Minnequa,Colo. C10	58.00	59.00	59.00	....
Rockwood,Tenn. T3	....	....	56.50	....
Toledo,O. I-3	56.00	56.50	56.50	57.00
Cincinnati, del.	61.76	62.26	....	....

* Low phos. southern grade. † Phos., 0.30 max.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.0-6.50% silicon; and $1.50 for each 0.5% Si; 75 cents for each 0.5% Mn over 1%)

Jackson,O. G2, J1	$67.00
Buffalo H1	68.25

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.45 for each 0.5% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls,N.Y. P15	$87.50
Keokuk,Iowa, Openhearth & Fdry, freight allowed K2	92.00
Keokuk, OH & Fdry, 12½ lb piglets, 16% Si, frgt, allowed K2	95.00
Wenatchee,Wash. OH & Fdry, freight allowed K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, intermediate A7	$61.00
Rockwood,Tenn. T3	70.00
Steelton,Pa. B2	64.00
Philadelphia, del.	64.00
Troy,N.Y. R2	64.00

STEEL MAGAZINE REPORTS
FEBRUARY 1, 1954

"23% OF BUYERS ARE TRYING NEW SUPPLIERS"

DOLAN STEEL REPORTS 23.32% INCREASE IN NEW ACCOUNTS!

In a recent survey, reported in the February 1st issue, *Steel* magazine revealed that "nearly one fourth of steel . . . buyers are switching to at least one new source of supply." The reason: a search for faster service, lower freight costs, better deals. However, during the first quarter of this year, Dolan Steel reports an increase of over 23% in new accounts.

. . . and Here's Why!

FASTER SERVICE — Fast processing of all orders is made possible by Dolan's complete facilities for shearing sheet stock up to ⅜" thick . . . slitting coils up to 48" wide . . . decoiling steel in gauges from .050 to .187, in widths to 52". Complete stocks of sheet and strip steel in all finishes, tempers and gauges enable us to fill your orders promptly and accurately.

LOWER FREIGHT COSTS — Dolan's own fleet of fifteen modern trucks delivers all orders exclusively — no outside carriers, no conflicting rates. In addition, the first Net Delivered Price Schedule in the field, developed by Dolan, shows at a glance exactly what you pay for steel, delivered to your plant. No base extras . . . no size extras . . . no quantity extras to compute.

PRICE ADVANTAGES — Dolan's policy of low mill price and immediate service enables you to purchase guaranteed tolerance Cold Rolled Strip as you need it . . . cuts handling costs . . . keeps your inventory at an absolute minimum.

On Sheet, Dolan's complete inventory of *all grades* gives you lowest possible cost.

Our increasing volume in accurate cut-to-size Blanks proves the tremendous savings possible at Dolan.

mplete Source For Flat Rolled Steel . . . It Should Be DOLAN!
rces For Flat Rolled Steel . . . One Of Them Should Be DOLAN!

Steel Company Inc.

810 Union Avenue Bridgeport 7, Conn. Phone 5-8173

WAREHOUSE STEEL PRODUCTS

(Representative prices, cents per pound, subject to extras, f.o.b. warehouse. City delivery charges are 20 cents per 100 lb except: New York, 30 cents; Philadelphia, 25 cents; Birmingham, Erie, St. Paul, 15 cents; Seattle and Spokane, Wash., no charge.)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	Hot Rolled	Cold Rolled	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.‡	H.R. Alloy 4140††[c]		Carbon	Floor
Baltimore	6.20	7.64	7.78	7.00	...	6.86	8.17[e]	12.04	6.98	6.85	7.98
Birmingham	6.10	7.00	8.00[a]	6.30	...	6.15	8.90	....	6.35	6.35	8.25
Boston	6.89	7.83	9.18	7.13	...	6.87	8.35	12.13	7.06	7.13	8.26
Buffalo	6.18	7.15	8.70	6.79	...	6.35	7.70	12.02	6.59	6.68	7.88
Charlotte, N. C.	6.95	7.80	8.69	6.90	...	7.10	8.37	....	7.10	7.10	8.37
Chicago	6.18	7.12	7.95	6.42	...	6.28	7.30	11.60	6.46	6.33	7.46
Cincinnati	6.30	7.11	8.20	6.66	...	6.52	7.60	11.85	6.64	6.62	7.71
Cleveland	6.18	7.12	7.90	6.58	...	6.34	7.40	11.74	6.79	6.50	7.63
Detroit	6.38	7.29	8.22	6.69	7.36	6.56	7.60	11.97	6.91	6.80	7.80
Erie, Pa.	6.15	...	8.15	6.45	...	6.23	7.50[e]	....	6.46	6.33	7.46
Houston	7.15	7.60	9.23	7.45	9.30	7.45	9.30	....	7.35	7.20	8.55
Los Angeles	7.25	9.00	8.60	7.55	11.20	7.15	9.10	13.10	7.35	7.20	9.25
Milwaukee	6.35	7.29	8.12	6.59	...	6.45	7.57	11.77	6.63	6.50	7.63
Moline, Ill.	6.53	7.47	8.35	6.77	...	6.63	7.65	....	6.81	6.68	...
New York	6.78	7.52	8.37	7.16	...	7.06	8.43[e]	11.99	6.90	6.99	8.30
Norfolk, Va.	6.90	...	...	7.00	...	7.00	8.50	....	7.00	7.00	7.85
Philadelphia	6.35	7.13	7.87	7.02	8.80	6.87	8.19[e]	11.74	6.67	6.63	7.66**
Pittsburgh	6.18	7.12	8.00	6.55	...	6.28	7.65	11.60	6.46	6.33	7.46
Portland, Oreg.	7.90	8.45	9.15	7.65	...	7.35	10.65	....	7.25	7.30	9.15
Richmond, Va.	6.50	...	8.67	7.10	...	7.05	8.20	....	7.10	6.85	8.20
St. Louis	6.48	7.42	8.25	6.72	...	6.58	7.70	11.90	6.86	6.73	7.86
St. Paul	6.84	7.78	8.66	7.08	...	6.94	8.06	....	7.12	6.99	8.12
San Francisco	7.35	8.70	9.30	7.60	...	7.15	9.75	12.90	7.25	7.20	9.25
Seattle	8.15	9.50	9.80	8.00	...	7.60	10.65	13.50	7.50	7.60	9.40
Spokane	8.15	9.40[b]	9.80	7.60	...	7.60	10.55[a]	14.15	7.25	7.35	9.40
Washington	6.71	7.65	8.35	7.51	...	7.37	8.43	....	7.49	7.36	8.49

*Prices do not include gage extras; †prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extras excluded); ‡includes 35-cent special bar quality extra; §as rolled; **⅛-in. and heavier, add 0.34c for 12 gage and lighter. ††as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip and cold-finished bars, 2000 lb and over, except in Seattle where base is 2000 to 9999 lb; [a]—500 to 9999 lb; [b]—1000 to 1999 lb; [c]—1000 lb and over; [d]—1500 lb to 3999; [e]—under ½ in.

Distributors Reducing Inventories

Process is slow due to small volume of material moving from warehouses. Replacement orders are restricted to those necessary to maintain well balanced position

Boston — Reduction of inventory will be attempted by distributors through the balance of this quarter at least. This is a slow process at the current rate of business, largely confined to small-lot orders, most requiring some fabricating for size and shape. Demand for alloys is dull. Stocks of stainless steel are usually ample, including nickel-chromium grades. Warehouses are placing small replacement orders with mills.

County-metropolitan area delivered pricing schedule, initiated by Brown-Wales Co., Cambridge, Mass., has had a stabilizing effect on the market. This schedule is based on the lowest truck rate from the nearest competing warehouse district.

Pittsburgh—Sales follow an erratic pattern. Over-all May sales are expected to be near the April level, said by many distributors to have marked a levelling-off point for sales. Later this quarter fabricators are expected to build stocks against a possible strike, but this effect is not yet felt.

Cold-finished bars and structural shapes are two best-moving products. Both cold-finished and hot-rolled sheet sales are dull. With fabricators placing small orders with mills, warehouses are selling sheet only where they can offer a cost advantage.

Chicago—Warehouse steel sales in April fell below those in March, indicating the gain made in the latter month was only a flurry. Prospects are that May business will continue essentially at present level since factors indicating any significant change are absent. Inventory reduction still is being practiced by some consumers. Warehouse stocks are complete and balanced.

Philadelphia — Warehouse business reflects little change from the moderate rate of the past several weeks. Sheets and structurals appear to be moving the best among the major products. Distributors' base prices have shown no recent change.

Los Angeles—Warehouse mill purchases are higher except in structural shapes, for which demand remains

STEEL IMPORT PRICES

(Base, per 100 lb, landed, duty paid)

	North Atlantic	South Atlantic	Gulf Coast	West Coast*
Deformed Bars, Intermediate, ASTM-A-305	$4.55	$4.55	$4.50	$4.83
Bar Size Angles	4.40	4.40	4.35	4.68
Structural Angles	4.40	4.40	4.35	4.68
I-Beams	4.40	4.40	4.35	4.68
Wide Flange Beams	4.80	4.80	4.80	5.08
Sheet and Plate, 10 gage, 11 gage, 5' x 10'	5.50	5.50	5.45	5.78
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.50	25.70	25.50	26.34
Barbed Wire	6.60	6.60	6.60	6.68
Merchant Bars	4.55	4.55	4.50	4.83
Hot-Rolled Bands	4.70	4.70	4.65	4.98
Wire Rods, Thomas Commercial No. 5	4.77	4.84	4.82	5.09
Wire Rods, O-H, Cold Heading Quality No. 5	5.23	5.30	5.28	5.55
Bright Common Wire Nails, 8d	6.55	6.65	6.60	6.86

*Not including $2.20 per net ton customarily charged in most West Coast ports for wharfage and handling.

Size O.D.	Wgt/Foot/Lb	Gulf Port	West Coast	Vancouver
Seamless A.P.I. Casing, Grade J-55:				
5½ in.	15.5	$1.47/ft	$1.51/ft	$1.32/ft
7 in.	23	2.10/ft	2.17/ft	1.90/ft
Seamless N-80 Casing:				
5½ in.	17	1.94/ft	2.00/ft	1.75/ft
7 in.	23	2.50/ft	2.70/ft	2.36/ft
Seamless J-55 Tubing:				
2⅜ in.	4.7	0.60/ft	0.63/ft	0.55/ft
2⅞ in.	6.5	0.80/ft	0.83/ft	0.73/ft

Sources of shipment: Western continental European (Schuman Plan) countries.

sluggish. Price competition, especially in galvanized sheets, is keen. Demand for small diameter pipe and casing is stronger.

Seattle—Warehouses dealing in specialized items report April showed greater volume than March, which initiated the seasonal upturn. Inventories of aluminum, copper and other items are reasonably heavy and a good year is anticipated. Buyers having worked off material surpluses are now interested only in items for immediate use. Increased business for private construction is noted, although public works projects continue to require substantial tonnages. There is no shortage of aluminum items and producers are delivering promptly. The price structure in Seattle territory continues stable. Some minor adjustments have been made recently.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 182

Boston — Demand for reinforcing bars and mesh is well maintained, but competition brings out some price differences. New school requirements, most designs taking more bars than structurals, bolster bar demand. Lack of municipal housing projects reduces larger individual inquiries.

Seattle—Reinforcing bars are in active demand, considerable tonnage being involved in a number of ammunition storage projects at Army centers in Washington and Alaska. Construction of grain storage facilities in this area also is calling for steel items.

Semifinished Steel . . .

Semifinished Prices, Page 182

Los Angeles—Steelmaking at Kaiser Steel Corp.'s Fontana Works resumed after an eight-day walkout by CIO United Steelworkers. Arising from the discharge of four maintenance workers, the strike idled 5500 men.

Fontana, Calif.—Kaiser Steel Corp. lost about 20,000 ingot tons of production during the seven day strike, which came to an end Apr. 29. Some of it is dead loss, especially in flat-rolled products where the finishing mills had been operating at capacity prior to the walkout.

San Francisco — Incoming orders in April exceeded those placed in March. Mills expect May business to be even better. Most orders are for immediate delivery, although some June business is being placed. Cancellations are nil.

Demand for Sheets Continues To Rise

Trend is expected to be maintained at least through June since users are fabricating more tonnage than they are ordering. Pace may slacken in vacation period

Sheet and Strip Prices, Page 182 & 183

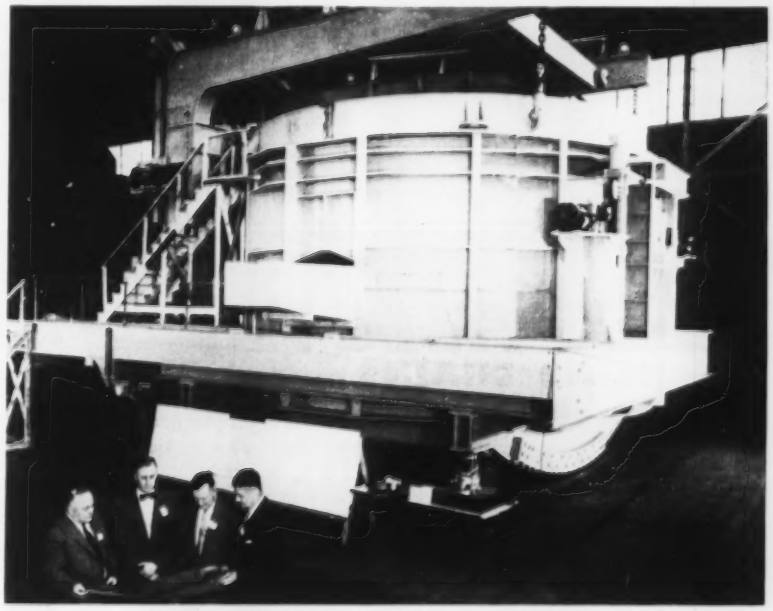
Philadelphia—Sheet specifications are increasing slowly, but steadily. Some producers believe this trend is likely to continue. They say consumers are fabricating more tonnage than they are ordering and that, therefore, more tonnage will be needed as time goes on for stock replacements. Cold, hot and galvanized sheets are the best moving grades, in that order. Stainless sheets are active, among the specialties.

New York—Sheet fabrication continues at a fairly good pace, especially for such work as door bucks and frames, cabinets, office furniture, shelving, and the like. Were it not for substantial inventories, much of which was shipped in late last year and early this year, these consumers would be specifying at a much freer rate. However, specifications are somewhat larger than they were, for stock replacements on certain sizes and gages are becoming necessary upon occasion.

Most sheet makers anticipate further mild improvement over the remainder of this quarter, especially in cold-rolled sheets, although pressure for sheets for the manufacture of air conditioning units will wind up this month, leaving a gap that will have to be filled elsewhere, if the present trend is to be sustained.

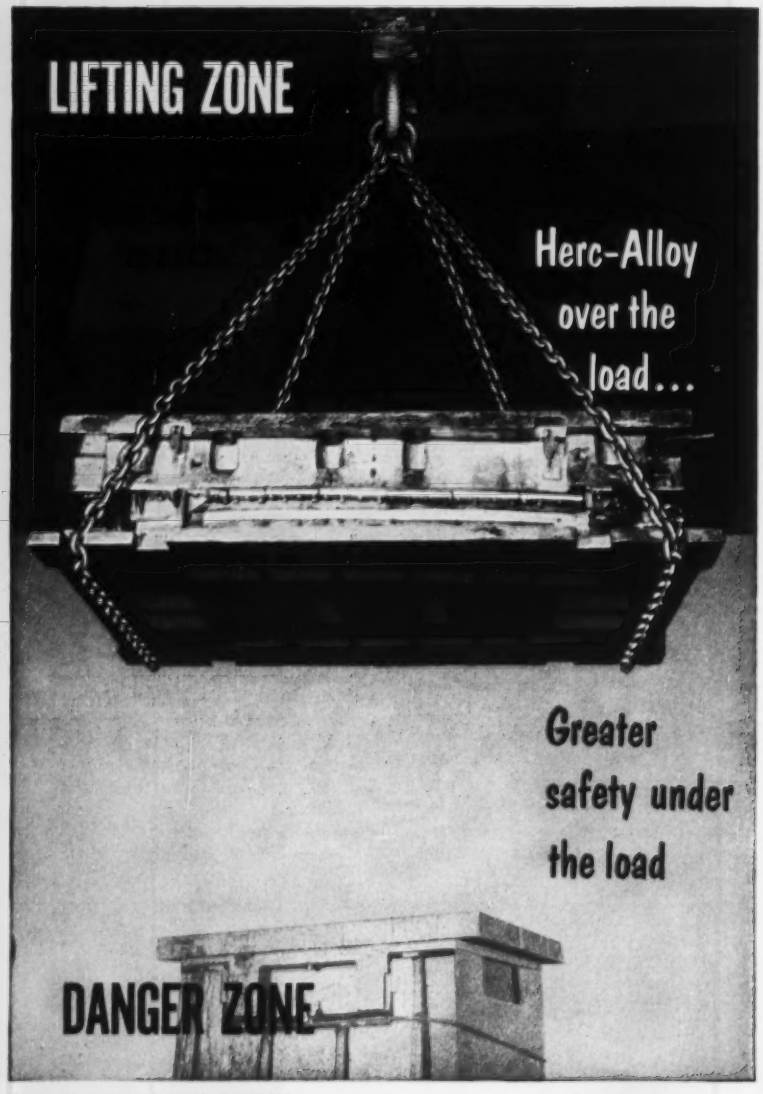
Boston—Sheet and strip bookings for May and June hold slight hope for substantial increase in rolling schedules through the balance of the second quarter. Contrary to expectations, order volume is hardly maintaining April schedules. Furthermore, intense sales canvassing points to a slack third quarter when there will be extended vacation suspensions and a consequent decline in consumption.

Most sellers now look to the Sep-



American Bridge Builds Huge Furnace for McLouth

One of the two 200-ton Heroult electric furnaces being built for McLouth Steel Corp., Detroit, is shown above. Described as the world's largest electric steelmaking furnace, it went on display upon completion by United States Steel Corp.'s American Bridge Division at its Ambridge, Pa., plant. Inspecting the furnace are (left to right) Oscar Seidel, plant manager, and Austin Paddock, vice president-operations, American Bridge; James R. Walsh, McLouth; Norman Obbard, vice president and general contracting manager, American Bridge



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tember-October period for the long-awaited upturn. More consumers, who have not bought for 60 to 90 days, are writing up some flat-rolled tonnage, including June, but buying is based on projected consumption. High inventories are no longer the only major reason for slow orders; potential consumption is another leading factor. However, any change in the defense outlook or threat to current production would change this pattern promptly.

Chicago—May orders for flat-rolled products are failing to show any significant expansion in automotive requirements or any other area of use which suggest sharply better business ahead. Cold-rolled sheets enjoy better demand than hot-rolled. Best activity is in galvanized sheets because of current grain bin requirements and seasonal demand for farm and construction materials.

Pittsburgh—Cold-rolled sheet orders are mounting rapidly at Pittsburgh Steel Co., officials reported during official opening of that company's cold mill at Allenport, Pa., last week.

Elsewhere automakers hold the key to better sheet sales. Their ordering is uncertain, particularly among independent producers. With cold-finished sheet sales showing slight improvement, hot-rolled demand is dull. Producers say inventory trimming continues, with use of steel 5 to 10 per cent above shipments.

Shipments of electrical sheets are improving gradually. Strip and silicon sheet sales show sporadic gains followed by lapses.

Los Angeles — Sheetmakers' May order books are filled. Unauthorized strike at Kaiser Steel Corp.'s Fontana Works will postpone delivery promises from 10 days to two weeks. Los Angeles plane plants are set to receive $2.5 billion in new Air Force plane contracts.

Tubular Goods . . .

Tubular Goods Prices, Page 185

Pittsburgh—Sales of oil country goods remain strong, but improvement in other tubular products is unlikely in the second quarter. Orders have been received for third quarter delivery of oil country goods, but sales of most seamless grades are slow. Buttweld demand is sluggish. An increased rate of inquiries suggests improvement in demand may take place in summer.

San Francisco—French-made pipe, ranging from ½ in. to 2 in., is being offered here. These offerings, coupled with pipe of ½ in. to 3 in. being sent in from Australia, are

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OUR 100th YEAR

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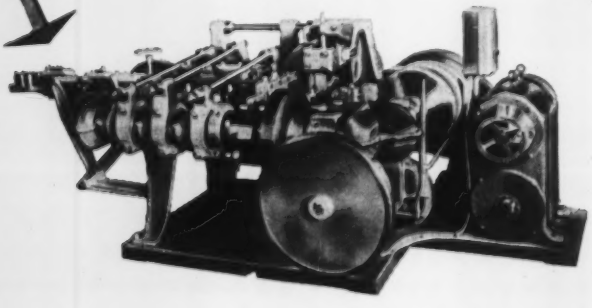


competing for local favor by price quotations running from 9 per cent to about 20 per cent below those of domestic producers. The foreign offerings are pervading the entire West Coast, but not too far inland where the freight charges begin to cut into the price advantage.

Seattle—Cast iron pipe agencies report considerable volume in small tonnages moving out of warehouses. Bids are in at Pasco, Wash., for more than 500 tons of 16 to 6-in. water mains. Smaller tonnages are pending elsewhere in Washington and Oregon.

Plates . . .

Plate Prices, Page 182

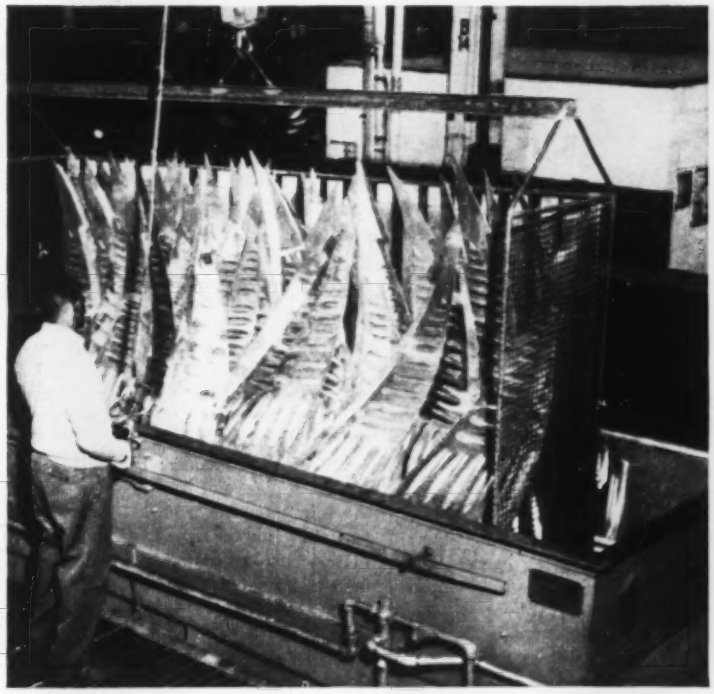
New York—An upturn in demand from either the shipyards or the railroads, particularly the latter, would have salutary effect on plates. However, there is little of early promise in either direction, and plate makers are generally reconciled to at least another month of lagging demand. The principal encouraging aspect at present is the fact that excess consumer inventories are steadily being worked off. There are continued evidences of this, with a consumer here and there coming into the market for tonnage for the first time in a number of weeks—not due necessarily to any special improvement in demand for his product, but to the fact that inventories have reached the point where some replacement is necessary.

Boston—Plate shops are buying for specific needs and practically nothing for inventory. Tank tonnage is off slightly, shops having covered for heavier requirements against recently-booked contracts. Structural shops are well covered, while warehouses have substantial stocks. Prompt delivery operates against forward buying of carbon plates with shipments frequently made within two weeks; orders frequently are tied in with best delivery and any delay brings immediate pressure for shipment, reflecting how closely shops are operating on supply.

Shipyards are diversifying with weldments and special fabricated work, taking heavier plates.

Mills are not absorbing freight on carbon plates.

Philadelphia — While at possibly the lowest point since the recession set in, plate production in this district has leveled off, with little change on an average over recent weeks. Most producers believe that the bottom has been reached, although admitting they don't see an increase in early prospect. Encour-



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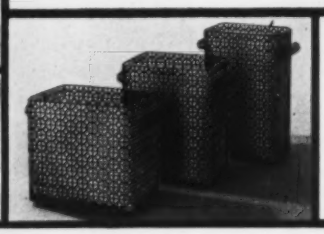

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V-type 4-cylinder 15 to 36 hp.

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aging to sellers, however, are signs of a further reduction in excess consumer inventories and a livelier demand, seasonally, from fabricators of fuel oil storage tanks.

Pittsburgh — May sales of plate continue good, but some slowness is developing in shipments to welded pipe fabricators, warehouses and farm equipment producers. While the construction industry and barge builders continue to require large quantities of plate, those consumers have sizable inventories and are buying only for quickest possible delivery. Cancellations from freight car-builders affect that market adversely.

Chicago—Considerably reduced activity in railroad freight car building has been the greatest single factor in increasing availability of plates. From here on, or until demand changes significantly, there is little likelihood that any serious tightness will occur. One platemaker in this area reports delivery of both sheared and universal mill plates can be done in four to five weeks. Compared with recent schedules, this is one week less for sheared and unchanged for universal.

Seattle—Local plate fabricators are catching their breath after the recent labor dispute shutdown which interrupted operations in some instances for nearly eight weeks, or practically 20 per cent of a normal year's work. They are now trying to make up lost time and clear backlogs which have accumulated. For this reason it is difficult for them to figure on new orders for prompt delivery.

Steel Bars . . .

Bar Prices, Page 182

Pittsburgh — Producers say bar sales have reached what should be the low point for this quarter. Activity occurs in spurts as fabricators work through inventories. Barmakers report over-all effect is an increase in cold-finished sales this month.

In some cases, decreased activity at hot-rolled bar plants is making it difficult for cold finishers to secure supplies quickly enough to make their deliveries on time.

Boston—For free machining, cold-finished bar specifications are more competitive among leaded steel and higher resulphurized grades. While not so uniform as to extras, leaded steel is being pushed by some producers while others are upping sul-

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Heat Treated Black Satin Finish

Made of high carbon steel — AISI C-1038. Furnished with black satin finish due to double heat treatment. Hexagon heads die made, not machined. Points machine turned; flat and chamfered. Tensile strength in accordance with SAE Grade 5. Carried in stock.

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SET SCREWS

Square head and headless — cup point. Case hardened. Expertly made by the pioneers in producing Cup Point Set Screws by the cold upset process. Cup points machine turned. Carried in stock.

FILLISTER CAP SCREWS

Heads completely machined top and bottom. Milled slots — less burrs. Flat and chamfered machined point. Carried in stock.

FLAT HEAD CAP SCREWS

Heads completely machined top and bottom. Milled slots — less burrs. Flat and chamfered machined point. Carried in stock.

"SHINYLAND" STUDS

All studs made steam-tight on tap end unless otherwise specified, with flat and chamfered machined point. Nut end, oval point. Land between threads shiny, bright, mirror finish. Carried in stock.

ADJUSTING SCREWS

Valve tappet adjusting screws — Hexagon head style — to blue print specifications — hexagon head hard; polished if specified — threads soft to close tolerance — points machine turned; flat and chamfered.

CONNECTING ROD BOLTS

Made of alloy steel — heat treated — threads rolled or cut — finished to extremely close thread and body tolerances — body ground where specified. Expertly made by the pioneers in producing connecting rod bolts by the cold upset process.

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Case hardened to proper depth and ground to close tolerances. Thread end annealed. Supplied in various head shapes, with oil holes and grooves of different kinds, and flats accurately milled.

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For ornamental purposes. Steel insert — steel covered. Finish: plain, zinc plated, cadmium plated. Size: 9/16", 3/4", 15/16" across the flats.

Tapped 1/4" to 3/4" inclusive. Cross section of Ferry patented acorn nut, showing how steel hexagon nut fits snugly into shell.

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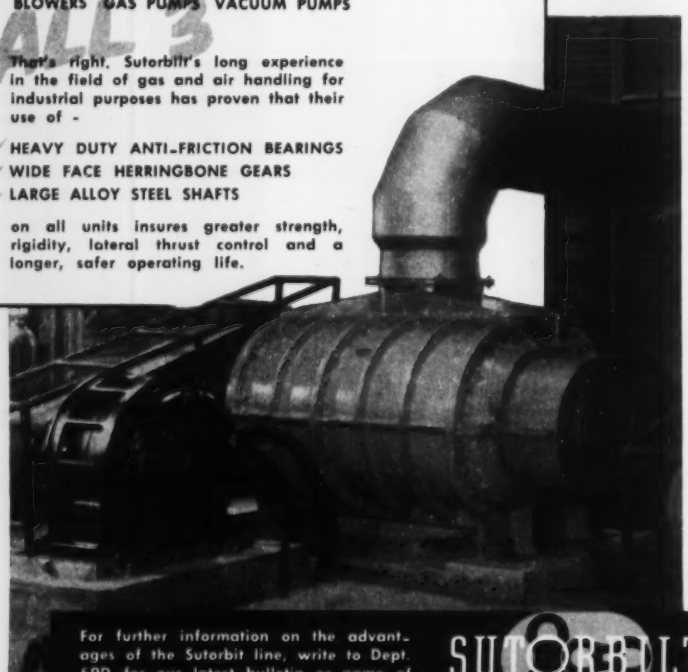

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phur content: Leaded grades are slightly higher in cost. Both are making inroads on bessemer. Special equipment is required for open hearths for removal of fumes in making leaded steel and several are experimenting with higher sulphur to avoid these installations. Competition centers largely for screw machine products.

Philadelphia—While showing little buoyancy, hot carbon bar demand is at least being sustained. Some producers, in fact, regard buying as slightly improved, reflecting a rather definite pick-up in specifications from cold drawers and lower consumer inventories. However, until mill shipments become more extended, consumers likely will continue to buy largely on a hand-to-mouth basis. This applies to hot and cold alloy and carbon material, for, while converters are experiencing somewhat better demand, they are endeavoring to keep their inventories up due to advantages to be gained in making quick deliveries.

Los Angeles—Prime aircraft manufacturers have pulled subcontracted work into their own shops, leaving contract machine shops loaded to about 35 per cent of capacity.

Wire . . .

Wire Prices, Page 184

Boston—Orders for steel wire are not maintaining the slight improvement registered around February. The volume has leveled off with bookings showing slight, if any, improvement over last month. Exceptions are pipe and mesh fabric and a slight pickup in specialties for shoe manufacturing. Even with inventories of high-carbon specialties and cold-heading wire down to low points buyers delay placing orders until the last minute, operating well within the normal lead time. Competition and availability permits consumers to obtain tonnage when needed.

Pittsburgh—Chain link fence and several other merchant products are enjoying a seasonal sales pickup. Increased sales also are reported among manufacturers wire producers, mainly a result of depleted consumer inventories.

Among users of wire, fastener producers have cut stocks of slow-moving items and are buying to fill stocks of all products. Automakers' purchases remain slow, while increased sales are reported to spring manufacturers.

Peoria, Ill. — March shipments of merchant trade products by Keystone

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"I thought I knew exactly what I needed in Stainless Steel Screws . . . and then I learned the *smart* way to buy. The folks at American showed me how to choose among the several types of Stainless on the basis of 3 factors: *Hardness, Corrosion-resistance, and Economy.* And sure enough, they came up with a better fastener for my job than the one I thought I wanted . . . at a cost that was less than I expected."

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Steel & Wire Co. and subsidiaries established an all-time record, says R. E. Sommer, president. The improvement shown in the first quarter reflected a strong seasonal recovery in demand for such products as farm fence, poultry netting and wire mesh reinforcing for building construction. Demand was general through all of the firm's sales territories.

San Francisco — Considerable amount of wire from Europe is beginning to appear in the local market as well as up and down the coast. Prices are somewhat below the competitive level of local mills.

Rails, Cars . . .

Track Material Prices, Page 185

Seattle—While no substantial railroad orders for tie plates, angle bars and other items have been placed this season with local nut and bolt plants, business is reported to be holding up well, backlogs being of fair proportions.

Structural Shapes . . .

Structural Shape Prices, Page 182

Chicago — Demand for structural shapes holds consistently steady with building construction maintaining a good level. With construction activities well diversified and wide spread, fabricating activities look solid for several months ahead. Except for wide-flange beams, deliveries of shapes are fairly easy, ranging from two to four weeks.

Boston — Fabricated structural steel demand is maintained and second-half bridge needs probably will lift bookings somewhat ahead of last year. Structurals needed for airfield base facilities also are an important factor. Fabricating shops have well balanced stocks, including wide-flange beams, and are buying plain material for fill-ins. Mills are not absorbing freight on structurals and former rates apply on rail shipments. Erection of small bridges for the Maine turnpike extension is bolstering use of bolts; rivet and bolt alternates taken thus far favor the latter price-wise by around $7.50 ton or $48.50 per ton for bolted erecting.

New York — Structural activity again is somewhat livelier, with buying featured by the placing of 7000 tons of bridgework for the Major Deegan expressway in the Bronx. Thirty-three hundred tons of New York state thruway work are up for figures May 20.

Seattle — The larger fabricators

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have comfortable backlogs of structural orders and expect operations to be maintained at current levels throughout the year. Smaller plants find competition increasing and profit margins shaved closely.

Pig Iron . . .

Pig Iron Prices, Page 186

Philadelphia—Merchant trading in pig iron continues restricted, but unchanged. Some leading sellers report no variation in the last several weeks. Meanwhile, a drive is being made to develop enough business to justify the resumption of operations at the Chester, Pa., furnace, operated by Chester Blast Furnace Inc., subsidiary of Barium Steel Corp., for at least three months, beginning June. This furnace has a monthly capacity of around 12,500 tons. Operator, it is said, would like to build up a monthly backlog of 7500 tons of merchant business—foundry, malleable and basic—with the remaining 5000 tons to be taken by the Central Iron & Steel Co., Harrisburg, Pa., and the Phoenix Iron & Steel Co., Phoenixville, Pa., of the Barium organization.

The iron is being offered at around $46-$47, furnace, depending upon type of iron. This, it is pointed out, is approximately $12 under prices of other domestic producers in the district. Chester has some orders on hand, but will probably have to get more, if sufficient pig iron is booked for at least three months' operation.

The three blast furnaces of Bethlehem Steel Co. at Steelton, Pa., are scheduled to be put into blast June 1, following a six weeks' suspension.

Boston—Pig iron melt holds at 65 to 70 per cent of capacity, the larger iron consumers showing slight gain. Most of the foundries are not operating more than four days per week and are not at capacity for that level. One noteworthy development is a decline in rejects with all shops.

New York—Most pig iron sellers anticipate no change in business volume this month. Actually, they believe there will be little variation in the rate which has prevailed for the past several weeks, and, as consumption has been light and inventories at most consumer plants have been above normal, this rate has been limited. Eventually, consumer stocks will reach the stage where replacements will be necessary, but most sellers doubt that this will have much bearing on business this month.

Buffalo — Mixed tendencies continue to prevail in the merchant pig iron market here. Automotive and building casters continue to call for substantial tonnages. An expected increase in production failed to develop as lighting of an additional furnace was offset by another unit being shut down for repairs. Foundries are having difficulty maintaining full production schedules.

Pittsburgh—Improvement in merchant pig iron shipments noted in early spring dwindled last month and shipments are now near the year's low point. Cutbacks and cancellations continue to grow.

U. S. Steel banked one of the Carrie furnaces at Rankin, Pa., not requiring the iron for reduced operations. Now 38 of 54 furnaces are in blast in this district.

Chicago—Foundry operations for May probably will continue the spotty pattern which has been prevailing. Melting schedules of many shops are on a three or four-day basis, rising and falling with receipt of orders for castings. This is reflected in pig iron buying because the present practice is to carry minimum inventory. Iron sellers have open order books, but day-to-day phone calls for a car or two for prompt shipment hold up total volume.

Iron Ore . . .

Iron Ore Prices, Page 205

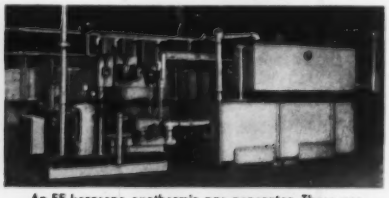
Pittsburgh—Jones & Laughlin Steel Corp. will option a large iron ore deposit six miles from Kirkland Lake, Ont., Canada, for purposes of further tests and study. Agreement was reached with Gulf Oil Corp. which controls the property.

The deposit is a magnetic taconite ore of Keewatin type. Tonnages and grades are not definitely known, but the property may contain a reserve of 150 million tons.

Cleveland—Shipments of Lake Superior iron ore continue to lag far behind the pace set a year ago. Average daily loading from United States ports for the week ended May 3 was only 165,762 tons compared with 413,817 for the like 1953 period. Total shipments for the week from all ports amounted to 1,178,226 tons, bringing the cumulative total for the season to May 3 to 1,943,649 tons. A year ago 9,832,641 tons had been brought down.

E. J. BLOCK opened the season, out of Escanaba, Apr. 19.

An EF installation consisting of a 1500 and a 3000 cfh exothermic horizontal water cooled type special atmosphere unit, each with desulphurizing towers and refrigerators for bright annealing steel and copper, and clean annealing brass.



An EF kerosene exothermic gas generator. These are also built in several sizes and types for producing special atmospheres for use in bright annealing copper and steel products in areas where fuel gases are not available.

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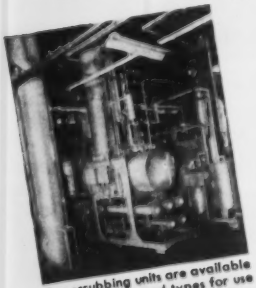

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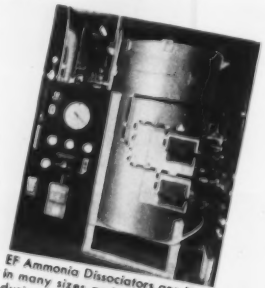

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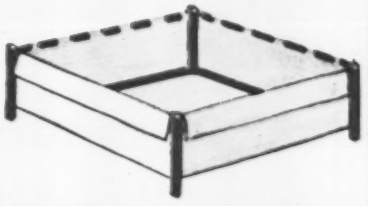

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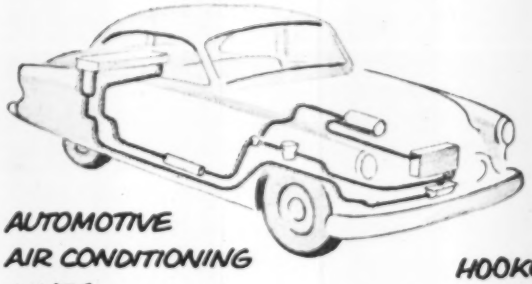

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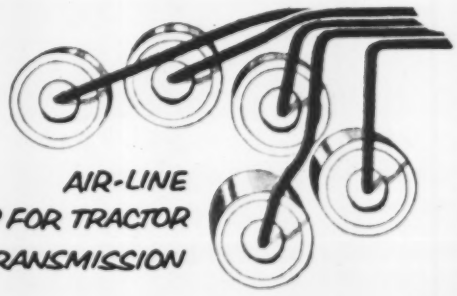

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COILS FOR PORTABLE REFRIGERATORS

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness,

and passed through a furnace. Copper coating fuses with steel. Result . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

BUNDYWELD TUBING®

DOUBLE-WALLED FROM A SINGLE STRIP

Leakproof
High thermal conductivity
High bursting point
High endurance limit
Extra-strong
Shock-resistant
Ductile

Lightweight
Machines easily
Takes plastic coating
Takes plating
Bright and clean
No inside bead
Uniform I.D., O.D.

Bundy Tubing Distributors and Representatives: ***Bridgeport, Conn.:*** Korhumel Steel & Aluminum Co., 117 E. Washington St. • ***Cambridge 42, Mass.:*** Austin-Hastings Co., Inc., 226 Binney St. ***Chattanooga 2, Tenn.:*** Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • ***Chicago 32, Ill.:*** Lapham-Hickey Co., 3333 W. 47th Place • ***Elizabeth, New Jersey:*** A. B. Murray Co., Inc., Post Office Box 476 • ***Los Angeles 58, Calif.,*** Tubesales, 5400 Alcoa Ave. • ***Philadelphia 3, Penn.:*** Rutan & Co., 1717 Sansom St. • ***San Francisco 10, Calif.:*** Pacific Metals Co., Ltd., 3100 19th St. • ***Seattle 4, Wash.:*** Eagle Metals Co., 4755 First Ave., South • ***Toronto 5, Ontario, Canada:*** Alloy Metal Sales, Ltd., 181 Fleet St., N.

Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.

WHAT ELSE IS THIS UNISHEAR CUTTING BESIDES STEEL?

You can't see it in the picture, but it's cutting fatigue —time and costs, too.

This "extra cutting power" of the Stanley UNISHEAR was acquired by Dolan Steel Co., Bridgeport, Conn., when they switched from hand-snip operation to UNISHEARS. Says Mr. James A. Dolan, Jr., of Dolan Steel Co.: "We use the Stanley UNISHEAR to cut the leading edge of the roll, to trim out imperfects, and to cut after slitting. We have come to regard the UNISHEAR as invaluable. It is a tremendous improvement over the hand-snip method. Not only does the UNISHEAR do a smoother, cleaner job, it saves our men a lot of fatigue and effects a time-saving in operations."

Thank you, Mr. Dolan! Dolan Steel Co. uses the UNISHEAR model shown here. But you have your choice of six different portable models and two stationary. Also cutting attachments and accessories. A directory of Stanley Service Stations (there's one near you) is packed with every tool.

No. U-212

For complete information write Stanley Electric Tools, 447 Myrtle Street, New Britain, Connecticut. Ask for Folder E-4.

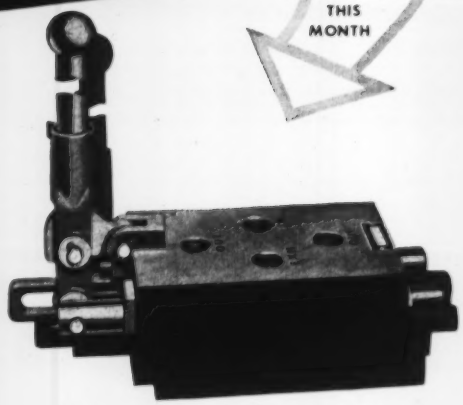
STANLEY **Electric Tools**

A Division of the Stanley Works

HARDWARE • TOOLS • STEEL STRAPPING • STEEL

Quick-As-Wink AIR AND HYDRAULIC Control Valves

FEATURE THIS MONTH



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For line pressures up to 5000 psi

● Unsurpassed for efficient trouble-free service controlling single or double acting hydraulic cylinders and other important high pressure hydraulic circuits. Positive, fast acting. All parts are in pressure balance, eliminating any tendency to creep or crawl. Machined steel housings, with chrome plated and polished stainless steel plungers. Self sealing U-packers. Metal valving rings take the impingement of the liquid, minimizing wear on the packings. ½" to 1½" sizes. Also available in pilot operated designs; sizes to 4". Write for details.

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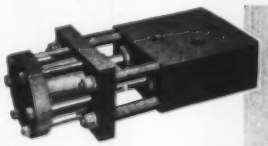

PILOT CYLINDER OPERATED HYDRAULIC VALVES

Two position valves 1½" to 4" sizes for line pressures from 1000 to 5000 psi. Valve is placed close to the work and operated from a central control point with an easy to handle air valve avoiding operator fatigue.

SOLENOID OPERATED AIR VALVES

Widely used for controlling single and double acting air cylinders, clutch and brake controls, etc. Solenoid is directly connected to valve operating mechanisms. ⅜" to 1½" sizes. 2-way, 3-way and 4-way actions.

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Hand, Foot, Lever, Cam, Pilot Diaphragm and Solenoid Control Valves

1913 EAST PERSHING STREET • SALEM, OHIO

CURRENT FERROALLOY QUOTATIONS

Prices as reported to STEEL

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton $86, Palmerton, Pa.; $87 Clairton and Duquesne, Pa.
(16 to 19% Mn) $84 per ton, Palmerton, Pa.; $85 per ton, Clairton and Duquesne, Pa.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $200, Clairton, Duquesne, Johnstown and Sheridan, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; and Portland, Oreg.; add or subtract $2.00 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%) Lump $208 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 76%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 27.95c per lb of contained Mn, carload packed 28.7c, ton lots 29.8c, less ton 31.0c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max 0.50% C, and 4.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85% C 1.5% max). Carload, lump, bulk 21.35c per lb of contained Mn, carload packed 22.1c, ton lot 23.2c, less ton 24.4c. Delivered. Spot, add 0.25c.

Manganese metal, 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max): Carload, lump, bulk, 36.2c per lb of metal; packed, 36.95c; ton lot 38.45c; less ton lots 40.45c. Delivered, Spot, add 2c.

Electromanganese: Min. carloads, 30c; 2000 lb to min. carloads, 32c; 250 lb to 1999 lb, 34c; less than 250 lb, 37c. Premium for hydrogen-removed metal, 1.5c per lb, f.o.b. cars, Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-85%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 11.00c per lb of alloy, carload packed, 11.75c, ton lots 12.65c, less ton 13.65c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $177 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium: Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $195 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, C.l., lump, bulk 24.75c per lb of contained Cr; c.l. packed 25.65c, ton lot 26.80c, less ton 28.20c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.025% C (Simplex) 34.50c per lb contained Cr, 0.03% C 36.50c, 0.04% C 35.50c, 0.06% C 34.50c, 0.10% C 34.00c, 0.15% C 33.75c, 0.20% C 33.50c, 0.50% C 33.25c, 1% C 33.00c, 1.50% C 32.85c 2% C 32.75c. Carload packed add 1.1c, ton lot 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%). Contract, c.l. 8 M x D, bulk, 26.25c per lb contained Cr. Packed, c.l. 27.15c, ton 28.50c, less ton 30.25c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low-Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8 M x D, 18.35c per lb of alloy; ton lot 19.2c; less ton lot, 20.4c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 24.75c per lb of contained chromium plus 10.8c per pound of contained silicon; 1" x down, bulk 25.25c per pound of contained chromium plus 11c per pound of contained silicon. F.o.b. plant; freight allowed to destination.

Chromium Metal: (Min 97% Cr and 1% Fe) contract, 1" x D; packed, max 0.50%, carload $1.12, ton lots $1.14; less ton $1.16. Delivered. Spot, add 5c. Prices on 0.10 per cent carbon grade, add 4c to above prices.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 35-55%, Si 8-12% max, C 3-3.5% max). Contract any quantity, $3.00 per lb of contained V. Delivered, Spot, add 10c **Crucible-Special Grades** (V 35-55%, Si 2-3.5% max, C 0.5-1% max). $3.10. **Primos and High Speed Grades** (V 35-55%, Si 1.50% max, C 0.20% max) $3.20.

Grainal: Vanadium Grainal No. 1, $1 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vandium Oxide: Contract, less carload lots $1.28 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si, packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 10.80c per lb of contained Si, carload packed 12.40c, ton lot 13.85c, less ton 15.5c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.7c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 12.2c per pound contained silicon; carload packed 13.55c; ton lots, 14.75c; less ton, 16.1c, delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.8c per lb of contained Si, carload packed 15.1c, ton lot 16.25c, less ton 17.5c. Delivered. Spot, add 0.8c.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 17.0c per lb of contained Si, carload packed 18.2c, ton lot 19.15c, less ton 20.2c. Delivered. Spot, add 0.25c.

Silicon Metal: (Mn 97% Si and 1% max Fe) C.l. lump, bulk, regular 18.5c per lb of Si, c.l. packed 19.7c, ton lot 20.6c, less ton 21.6c. Add 0.5c for max, 0.10% calcium grade. Deduct 0.5c for max 2% Fe grade analyzing min 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.25c per lb of alloy, ton lots packed 10.15c, 200 to 1999 lb 10.50c, smaller lots 11c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 30-43%, Fe 40-45%, C 0.20% max). Contract, c.l. lump, bulk 8.0c per lb of alloy, c.l. packed 8.75c, ton lot 9.5c, less ton 10.35c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroborn: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered, spot add 5c. F.o.b. Washington, Pa., prices, 100 lb and over are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.
Carbortam: (B 1 to 2%) Contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.0c per lb of alloy, carload packed 20.8c, ton lot 22.3c, less ton 23.3c. Delivered, Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Deld. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 16.25c per lb of briquet, carload packed 16.95c, ton 17.75c, less ton 18.65c. Deld. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 12.45c per lb of briquet, c.l. packaged 13.25c, ton lot 14.05, less ton 14.95c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 12.65c, per lb of briquet, c.l. packaged 13.45c, ton lot 14.25c, less ton 15.15c Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.3c per lb of briquet. Packed c.l. 7.10c, ton lot 7.9c, less ton 8.8c. Delivered. Spot, add 0.25c.

(Small size—Weighing aprox. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.45c. Packed c.l. 7.25c, ton lot 8.05c, less ton 8.95c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.80 per lb of contained W; 2000 lb W to 5000 lb W, $3.90; less than 2000 lb W, $4.02, f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 56-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $9.50 per lb of contained Cb, less ton $9.55. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min, C 0.30% max) ton lots, 2" x D, $4.75 per lb of contained Cb plus Ta, deld.; less ton lots $4.80.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed 1" x D, 45c per lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Contract, carload, packed, ¼" x 12 M, 17.5c per lb of alloy, ton lots 18.25c, less ton 19.5c. Deld. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.50c per lb of alloy; ton lots 18.50c; less ton lots 20c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l packed 16.6c per lb of alloy; ton lots 18.10c; less ton lots 19.35c, f.o.b, Niagara Falls; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 14.50c. Packed c.l. 15.50c, ton lots, 15.75c, less ton lots,16.25c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carloads, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, f.o.b. Langeloth, $1.32 in all sizes except powdered which is $1.41; Washington, Pa., furnace, any quantity $1.32.

Technical Molybdic-Oxide: Per lb contained Mo, f.o.b. Langeloth, Pa., $1.14 in cans; in bags, $1.13. f.o.b. Langeloth, Pa.; Washington, Pa., $1.13.

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POWER: Available water power, 1,358,000 H.P., with huge potential of 11,000,000 H.P. Natural gas assured in the near future.

RAW MATERIALS: $165,000,000 Mining Industry provides basic and industrial minerals in quantity, with great resources untapped.

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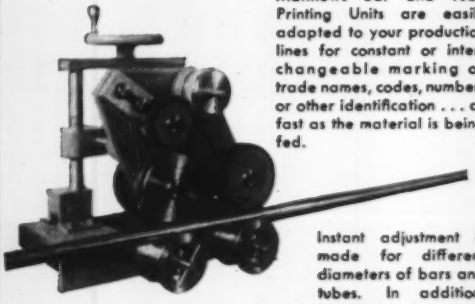

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Brings you a complete, up-to-date one-volume summary of current industrial electroplating processes. The only book that emphasizes both practical aspects and basic theory. The Penton Publishing Company, Book Department, 1213 West Third St., Cleveland 13, Ohio.

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ORES–COKE–REFRACTORIES

Prices as reported to STEEL; changes shown in italics.

ORES

Lake Superior Iron Ore

(Prices effective July 1, 1953, and thereafter; gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Old range bessemer	$10.30
Old range nonbessemer	10.15
Mesabi bessemer	10.05
Mesabi nonbessemer	9.90
Open-hearth lump	11.15
High phosphorus	9.90

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon which were in effect on June 24, 1953, and increases or decreases after such date are for buyer's account.

Eastern Local Iron Ore

Cents per unit deld. E. Pa.

Foundry and basic 56-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%	20.00
North African hematite (spot)	20.00-22.00
Brazilian iron ore, 68-69% (spot)	25.00

Tungsten Ore

Net ton unit, before duty

Foreign Wolframite, good commercial quality	$23.00-$24.00
Domestic scheelite, mine	63.00

Manganese Ore

Mn 48%, nearby, $1.02-$1.05 per long ton unit c.i.f. U. S. ports, duty for buyer's account; 46-47%, $0.95-$0.97.

Chrome Ore

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	$40.00-$42.00
48% 3:1	44.00-46.00
48% no ratio	32.00-34.00

South African Transvaal

44% no ratio	$24.00-$26.00
48% no ratio	34.00

Domestic

(Rail nearest seller)

48% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb, Mo content mines, unpacked	$1.00

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

50-60%	$2.40-$2.80
65% min.	$3.40-$3.50

Vanadium Ore

Cents per lb. V_2O_5 content, deld. mills

Domestic	31.00

REFRACTORIES

Fire Clay Brick

High-Heat Duty: Pueblo, Colo., $89; Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., Woodbridge, N. J., $109; Salina, Pa., $114; Niles, O., $120; Los Angeles, Pittsburg, Calif., $132.30.

Silica Brick

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Portsmouth, O., $115; Warren, O., Hays, Pa., $120; Niles, O., $120; E. Chicago, Ind., Joliet, Rockdale, Ill., $125; Cutler, Utah, $116.55; Los Angeles, $122.85.

Insulating Fire Brick

2300° *F:* Massillon, O., $178.50; Clearfield, Pa., $213; Augusta, Ga., Beaver Falls, Zelienople, Pa., Mexico, Mo., $206; Vandalia, Mo., $214.10; Portsmouth, O., $207.50; Bessemer, Ala., $212.80.

Ladle Brick

Dry Pressed: Bessemer, Ala., $64.60; Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Wellsville, O. $77.50; Mexico, Mo., $73.50; Clearfield, Pa., Portsmouth, O., $83; Perla, Ark., $109; Los Angeles, $110.25; Pittsburg, Calif., $111.30.

Sleeves

Reesdale, Pa., $139.70; Johnstown, Pa., $140; Clearfield, Pa., $148.50; St. Louis, $151.80; Athens, Tex., $155.

Nozzles

Reesdale, Pa., $223.50; Johnstown, Pa., $229.20; Clearfield, Pa., $241.40; St. Louis, $247.10; Athens, Tex., $247.70.

Runners

Reesdale, Pa., $174; Johnstown, Pa., $177.80; Clearfield, Pa., $185.50; St. Louis, $187.30; Athens, Tex., $191.80.

High-Alumina Brick

50 *Per Cent:* Clearfield, Pa., St. Louis, Mexico, Mo., $179; Danville, Ill., $169.30.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $223.00; Danville, Ill., $213.20.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $225; Danville, Ill., $258; Clearfield, Pa., $252.

Dolomite

Domestic, dead-burned bulk; Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Nario, Gibsonburg, Woodville, O., $14.50; Thornton, McCook, Ill., $14.60; Dolly Siding, Bonne Terre, Mo., $13.65.

Magnesite

Domestic, deadburned bulk; Luning, Nev., $38.

METALLURGICAL COKE

Price per net ton

Beehive Ovens

Connellsville, furnace	$14.50-$15.00
Connellsville, foundry	16.50-17.00

Oven Foundry Coke

Kearney, N. J., ovens	$24.00
Everett, Mass., ovens	
New England, deld.	*26.05
Chicago, ovens	24.50
Chicago, deld.	26.00
Terre Haute, ovens	24.05
Milwaukee, ovens	25.25
Indianapolis, ovens	24.25
Chicago, deld.	28.12
Cincinnati, deld.	25.85
Painesville, O., ovens	25.50
Cleveland, deld.	27.43
Erie, Pa., ovens	25.00
Birmingham, ovens	22.65
Cincinnati, deld.	27.58
Lone Star Tex., ovens	18.50
Philadelphia, ovens	23.00
Swedeland, Pa., ovens	23.00
St. Louis, ovens	
St. Louis deld.	26.00
St. Paul, ovens	23.75
Portsmouth, O. ovens	24.00
Cincinnati, deld.	26.62
Detroit, ovens	25.50
Detroit, deld.	26.50
Buffalo, deld.	28.08
Flint, deld.	28.23
Pontiac, deld.	27.06
Saginaw, deld.	28.58

*Or within $4.55 freight zone from works.

COAL CHEMICALS

Spot, cents per gallon, ovens

Pure benzol	40.00
Toluol, one deg	32.00-35.00
Industrial xylol	32.00-35.00

Per ton, bulk, ovens

Sulphate of ammonia	$44-$47
Birmingham area	45.00†

†With port equalization against imports.

Cents per pound, producing point

Phenol 40 deg. (U.S.P.), tank cars	18.00
c.l. drums	19.00
l.c.l. drums	19.50

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2½	30	28.00
3	40	27.25
4	40	26.00
5½	40	25.75
6	60	23.25
7, 8, 9, 10	60	21.00
12, 14	72	20.50
16	72	20.00
17	60	20.50
18	72	20.50
20	72	20.00

CARBON

40	100	$8.95
40, 35, 30	110	8.95
30	84	9.10
24	96	8.90
24	72, 84	9.10
20	90	8.95
20	84	9.10
17	72	9.10
17	60	9.50
14	72	9.50
14, 12, 10	60	10.30
8	60	10.55

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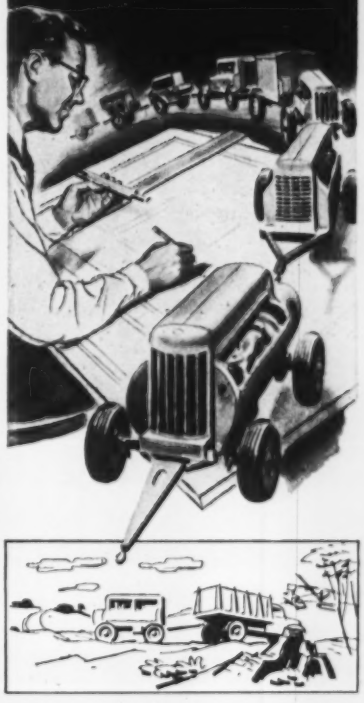

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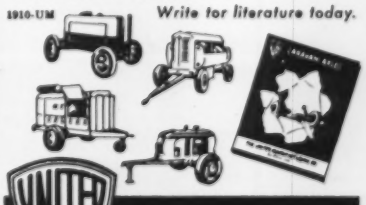

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another
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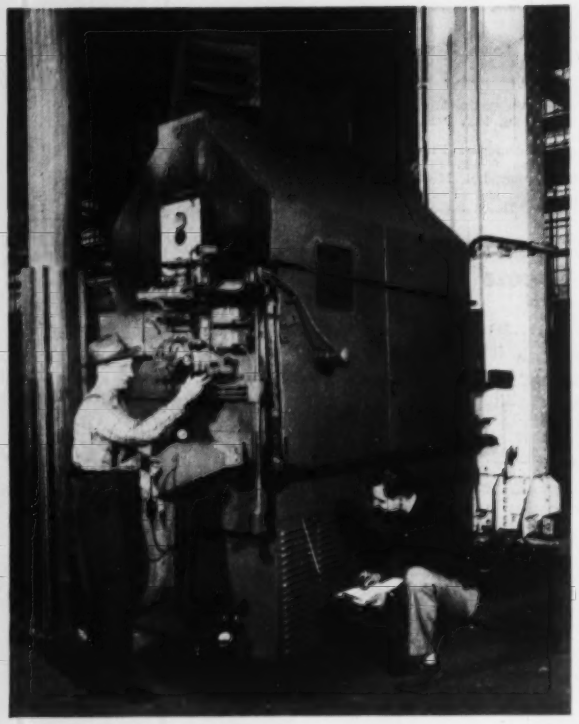

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☐ Gas Fired Unit Heater

☐ Please have a representative call at no obligation to me. Ask for Bulletin GH 598-687

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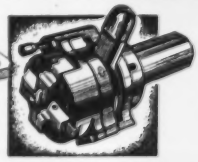

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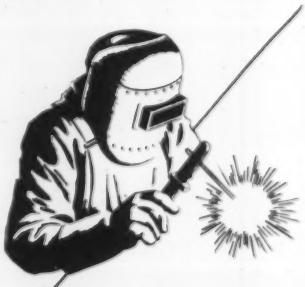
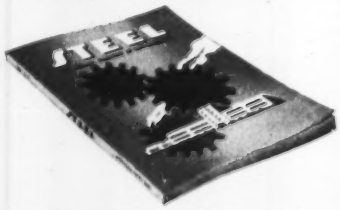


. . . your advertising belongs in STEEL!



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STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

7000 tons, Major Deegan Expressway, No. 54-1, Bronx, New York, for state of New York, through Corbetta Construction Co., general contractor, to Harris Structural Steel Co., New York.

1500 tons, building No. 633, Navy Yard, Philadelphia, to Belmont Iron Works, Eddystone, Pa.

510 tons, Mercy Hospital, Rockville Center, Long Island, N. Y., through John Kennedy & Co., to Pecker Iron Works, Brooklyn, N. Y.

500 tons, estimated, general purpose warehouse, Airfield base, Abilene, Tex., to Robberson Steel Co., Oklahoma City, Okla.; Robert E. McKee General Contractor Inc., El Paso, Tex., general contractor.

420 tons, Loyola School, East 83rd street, New York, through William A. Berbusse, general contractor, to Harris Structural Steel Co., that city.

395 tons, warehouse and pail manufacturing line building in Lancaster, Pa., Jones & Laughlin Steel Corp., Pittsburgh, to Frank M. Weaver & Co. Inc., Lansdale, Pa.

375 tons, factory and office, Bloomfield Tool Co., Roseland, N. J., through Walter Kidde Construction Co., to Max Corchin & Son, Philadelphia.

350 tons, state bridge, Monroe county, Pennsylvania, through Rake & Ritts, general contractors, to Bethlehem Fabricators Inc., Bethlehem, Pa.

335 tons, public school No. 74, Bronx, New York, through Maran Construction Co., general contractor, to Bethlehem Steel Co.

270 tons, automotive shop and facilities, airfield base, Portsmouth, N. H., to Groisser & Shlager Iron Works, Somerville, Mass.; George A. Fuller Co., Boston, general contractor.

250 tons, addition to Port of Seattle grain storage facilities, to Isaacson Iron Works, Seattle.

240 tons, building, United States Rubber Co., Jackson Heights, N. Y., through P. Kertzer & Son, general contractors, to Calvert Iron Works, Atlanta, Ga. This is a correction of a previous reference to the name of the fabricator.

230 tons, junior high school, Ewing Township, New Jersey, to Keystone Structural Steel Co., Trenton, N. J.

225 tons, Gorge creek bridge, Skagit river project, Seattle, to American Bridge Division, U. S. Steel Corp., Pittsburgh.

185 tons, state bridge, Schoharie county, New York, to Pine Brook Iron Works, Scranton, Pa.

165 tons, plant addition, Owens-Illinois Glass Co., Bridgeton, N. J., to Robinson Steel Co., Philadelphia.

150 tons, building, Villanova College, Villanova, Pa., to Belmont Iron Works, Eddystone, Pa.

145 tons, one-story warehouse, Federal Electric Products Co., Newark, N. J., through Engineers Co. Inc., to Oltmer Iron Works, Jersey City, N. J.

140 tons, J. J. Newberry store, Asbury Park, N. J., through Hendrickson Construction Co., general contractor, to Park Steel & Iron Co., that city.

130 tons, Bureau of Roads & Bridges, Snohomish county, Washington, to American Bridge Division, U. S. Steel Corp., Pittsburgh.

100 tons, wide flange beam bridge, Bristol-Starksboro, Vt., to Vermont Structural Steel Co., Burlington, Vt.; George Vredenburgh Co., Montpelier, Vt., general contractor.

100 tons, St. Paul's church, Seattle, to Pacific Car & Foundry Co., Seattle.

100 tons, grain storage facilities, Waterville, Wash., to Isaacson Iron Works, Seattle.

STRUCTURAL STEEL PENDING

1600 tons, state thruway bridgework, Westchester county, New York; bids May 20.

1480 tons, state bridge work, Orange county, New York; bids closed May 6.

1000 tons, state thruway bridge work, Erie county, New York; bids May 20.

900 tons, bridge work on Long Island for the New York City Transit Authority; Horn Construction Co. Merrick, Long Island, N. Y., low on general contract.

700 tons, Cross Bronx Expressway bridgework, state thruway, New York; bids May 20.

450 tons, hangar No. 11, Civic Aeronautic Administration, Idlewild, Long Island, N. Y., for Port of New York Authority; bids closed.

300 tons, state bridge work, Walnut street, New Castle, Del.; bids May 19.

REINFORCING BARS . . .

REINFORCING BARS PLACED

340 tons, addition to Swedish hospital, Seattle, to Northwest Steel Rolling Mills Inc., Seattle; Howard S. Wright Co., Seattle, general contractor.

270 tons, ammunition igloos, Ladd Air Base, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle; Boen-Egge Co., Seattle, general contractor.

220 tons, ammunition igloos, Elelson Air Base, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle; Lytle-Green-Birch, Seattle, general contractor.

180 tons, completion of University of Washington communications building, to Northwest Steel Rolling Mills Inc., Seattle; Cawdrey & Vemo, Seattle, general contractors, low $707,107.

REINFORCING BARS PENDING

3727 tons of reinforcing bars and 82,000 lineal feet of steel piling, comprising three contracts, piers and abutments in Bucks county, Pennsylvania, and Burlington county, New Jersey, for the Delaware river turnpike bridge, for the Pennsylvania Turnpike Commission and the New Jersey Turnpike Authority.

115 tons, Bureau of Public Roads & Bridges, Boise National Park, Idaho; Hansen & Parr Construction Co., Spokane, Wash., low $173,558.

PLATES . . .

PLATES PENDING

1800 tons, H-piling, reconstruction Army cargo terminal, Whittier, Alaska; bids in to U. S. Engineer, Seattle, but in excess of estimates.

PIPE . . .

STEEL PIPE PENDING

3700 ft of 16 in. steel pipe, 6500 ft of 12 in. pipe and pumping equipment; bids to Kennewick, Wash., May 11; Carey & Kramer, Seattle, engineers.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Maine Central, four 1000 hp diesel switching units, to American Locomotive Co., New York.

RAILROAD CARS PENDING

New York Central, air-conditioned multiple-unit coaches; bids asked on the basis of 50 cars and 100 cars.

Railway Express Agency, 300 to 600 fifty-ton refrigerator cars, for passenger train service; bids asked.

Transportation Corps, 50 forty-ton hopper cars; bids to be opened shortly. This agency recently received bids for the construction of 825 forty-ton box cars and 365 forty-ton gondola cars.

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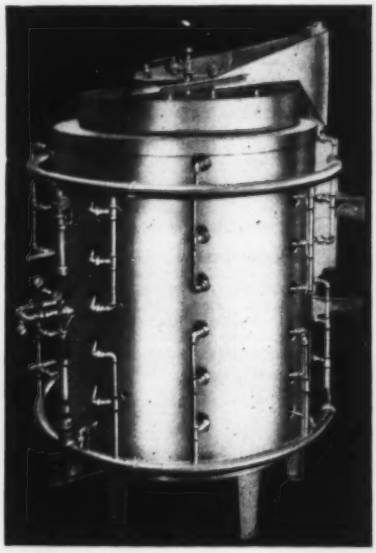

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Scrap Prices Rise on Broad Front

Advance lacks support of heavy mill buying in most districts, although some mills in East show increased interest. Actual consumption still lags

Scrap Prices, Page 210

Philadelphia — Open-hearth scrap prices have made the first advance in about four months, based primarily on purchases at Conshohocken, Pa., and further buying at Coatesville. No. 1 heavy melting steel is now $23, delivered; No. 2 heavy melting, $21; No. 2 bundles, $19, an increase of $1 in each case. No. 1 busheling has been advanced to $23, a $1 increase. No. 1 bundles has been jumped $2 a ton to $24.

Contributing to the stronger market tone are higher offerings from the Pittsburgh area and the general attitude among dealers to do no further business, if possible, in the heavy open-hearth grades at recent levels.

Other advances apply to electric furnace bundles, now holding at $24.50 delivered consumer plant; machine shop turnings, $12; mixed borings and turnings, $12 nominal; structurals and plate, $27; heavy turnings, $21; and couplers, springs and wheels, $31. Short shovel turnings and rail crops are unchanged at $16 and $41, respectively.

No. 1 cupola cast is higher at $36-$37 delivered; other cast grades are steady.

Buffalo—Prices on cast scrap advanced another dollar per ton last week in a stronger market here. Reports of outside buying interests bolstered the market, but no sales were noted at higher levels. Dealers were confused and unable to confirm reports that other lake points were endeavoring to obtain tonnages of scrap from local dealers. However, sentiment was supported by the lifting of an embargo by the major mill on orders placed in 1953 at prices sharply above those now prevailing.

Boston—No. 1 heavy melting steel prices have firmed with No. 2 grade and have recovered approximately $2 ton from the recent low. Bundles are also firmer, but lag somewhat behind other heavy melting grades. Slow also to respond to the stronger trend are borings and turnings. Rate on steel scrap from Boston to Pittsburgh will approximate $10.83 per ton when applicable in late June.

Chicago—Several important grades of open-hearth scrap have advanced $1 a ton, although demand is relatively weak. No. 1 heavy melting advanced to $31, No. 1 factory bundles to $32 and No. 1 dealer bundles to $30.

For 10 weeks steelmaking operations have fluctuated between 75 and 80 per cent of capacity. Thus, the market isn't being stimulated by rising consumption.

There is plenty of cast scrap available, but foundries note its lack of quality.

New York—Brokers' buying prices for steel scrap have undergone further advance, with trading improving. No. 1 heavy melting steel and No. 1 bundles are now being quoted $15-$15.50; No. 2 heavy melting steel, $14-$14.50; and No. 2 bundles $12.

Machine shop turnings are higher at $5-$5.50; mixed borings and short turnings, at $7; and low phos structural and plate, at $20-$21.

Short shovel turnings are unchanged; also, cast iron grades and stainless steel scrap.

Pittsburgh — At least two area mills are increasing purchases of scrap, although over-all requirements for the material are not expected to increase materially in the near future. Result of renewed activity is to increase price of No. 1 heavy melting $2 a ton to $28-$29. In the cast iron grades, No. 1 cupola and No. 1 machinery grades advanced $1. No. 1 railroad heavy melting gained $2.

Cincinnati—Scrap prices advanced here last week throughout the list, giving a better tone to the whole market. Biggest rise took place in mixed borings and turnings and in cast iron borings which climbed $2.50. No. 1 openhearth grade went up $2 while No. 1 cupola cast remained unchanged. Balance of the quotations advanced $1.

Cleveland—Scrap is moving freely in this district, but mills are not placing new large-tonnage orders.

Activity at jobbing foundries is slow and what had been 30-days stocks of scrap have stretched out to 60 days. Buying by captive

(*Please turn to page* 212)

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IRON AND STEEL SCRAP

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

May 6	$27.33
April 29	26.00
Mar. Avg.	24.37
Apr. 1953	42.88
Apr. 1949	24.06

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

(Delivered consumer plant)

No. 1 heavy melting	*28.00-29.00*
No. 2 heavy melting	*25.00-26.00*
No. 1 bundles	*28.00-29.00*
No. 2 bundles	*23.00-24.00*
No. 1 busheling	*28.00-29.00*
Machine shop turnings	*15.00-16.00*
Mixed borings, turnings	*15.00-16.00*
Short shovel turnings	*19.00-20.00*
Cast iron borings	*19.00-20.00*
Cut structurals	*30.00-31.00*
Heavy turnings	26.00-27.00
Punchings & plate scrap	30.00-31.00
Electric furnace bundles	*31.00-32.00*

Cast Iron Grades

No. 1 cupola	*37.00-38.00*
Charging box cast	33.00-34.00
Heavy breakable cast	30.00-31.00
Unstripped motor blocks	24.00-25.00
No. 1 machinery cast	*43.00-44.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*31.00-32.00*
Rails, 2-ft. and under	44.00-45.00
Rails, 18-in. and under	45.00-46.00
Rails, random lengths	38.00-39.00
Railroad specialties	34.00-35.00

Stainless Steel Scrap

(F.o.b. shipping point)

18-8 bundles & solids	165.00-170.00
18-8 turnings	85.00-90.00
430 bundles & solids	65.00-70.00
430 turnings	50.00-52.00

CLEVELAND

(Delivered consumer plant)

No. 1 heavy melting	*26.00-27.00*
No. 2 heavy melting	*22.00-23.00*
No. 1 bundles	*26.00-27.00*
No. 2 bundles	*19.00-20.00*
No. 1 busheling	*26.00-27.00*
Machine shop turnings	*12.00-13.00*
Mixed borings, turnings	*16.00-17.00*
Short shovel turnings	*16.00-17.00*
Cast iron borings	*16.00-17.00*
Low phos.	26.00-27.00
Cut structural plate 2 ft and under	34.00-35.00
Alloy free, short shovel turnings	*16.50-17.50*
Electric furnace bundles	*26.00-27.00*

Cast Iron Grades

No. 1 cupola	*41.00-42.00*
Charging box cast	*27.50-28.50*
Stove plate	36.50-37.50
Heavy breakable cast	*26.50-27.50*
Unstripped motor blocks	*25.50-26.50*
Brake shoes	30.50-31.50
Clean auto cast	41.50-42.50
No. 1 wheels	33.50-34.50
Burnt cast	31.50-32.50
Drop broken machinery	*42.00-43.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*31.00-32.00*
R.R. malleable	*41.00-42.00*
Rails, 3-ft. and under	43.00-44.00
Rails, 18 in. and under	46.00-47.00
Rails, random lengths	39.00-40.00
Cast steel	34.00-35.00
Railroad specialties	35.00-36.00
Uncut tires	36.00-37.00
Angles, splice bars	*41.50-42.50*
Rails, rerolling	41.00-42.00

Stainless Steel

(F.o.b. shipping point)

18-8 bundles, solids	nom. 160.00-170.00
18-8 turnings	nom. 70.00-80.00
430 clips, bundles, solids	nom. 70.00
430 turnings	40.00-50.00

YOUNGSTOWN

(Delivered consumer plant)

No. 1 heavy melting	*29.00-30.00*
No. 2 heavy melting	*24.00-25.00*
No. 1 bundles	*29.00-30.00*
No. 2 bundles	*22.00-23.00*
Machine shop turnings	*14.00-14.00*
Short shovel turnings	*19.00-20.00*
Cast iron borings	*19.00-20.00*
Low phos.	*30.00-31.00*
Electric furnace bundles	*29.00-30.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*31.00-32.00*

PHILADELPHIA

(Delivered consumer plant)

No. 1 heavy melting	*23.00*
No. 2 heavy melting	*21.00*
No. 1 bundles	*24.00*
No. 2 bundles	*19.00*
No. 1 busheling	*23.00*
Electric furnace bundles	*24.50*
Machine shop turnings	*12.00*
Mixed borings, turnings	*12.00**
Short shovel turnings	16.00*
Structurals & plate	*27.00*
Heavy turnings	*21.00*
Couplers, springs, wheels	*31.00*
Rail crops, 2 ft & under	41.00

Cast Iron Grades

No. 1 cupola	*36.00-37.00*
Malleable	39.00
Heavy breakable cast	36.50
Unstripped motor blocks	28.00*
Drop broken machinery	41.00

*Nominal.

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*15.00-15.50*
No. 2 heavy melting	*14.00-14.50*
No. 1 bundles	*15.00-15.50*
No. 2 bundles	*12.00*
Machine shop turnings	*5.00-5.50*
Mixed borings, short turnings	*7.00*
Low phos. (structural & plate)	*20.00-21.00*
Short shovel turnings	9.00-10.00

Cast Iron Grades

No. 1 cupola	29.00-30.00
Unstripped motor blocks	21.00-22.00*

Stainless Steel

18-8 sheets, clips, solids	165.00-170.00
18-8 borings, turnings	70.00-75.00
430 sheets, clips, solids	40.00
410 sheets, clips, solids	30.00

*Nominal.

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*17.00-18.00*
No. 2 heavy melting	*15.25-16.00*
No. 1 bundles	16.00-17.00
No. 2 bundles	*11.25-12.25*
Machine shop turnings	3.00-3.50
Mixed borings, turnings	5.50-6.00
Short shovel turnings	7.25-7.50
No. 1 cast	29.00-30.00
Mixed cupola cast	27.00-28.00
No. 1 machinery cast	*32.00-33.00*

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*25.00-26.00*
No. 2 heavy melting	*22.00-23.00*
No. 1 bundles	*25.00-26.00*
No. 2 bundles	*19.00-20.00*
No. 1 busheling	*25.00-26.00*
Machine shop turnings	*11.00-12.00*
Mixed borings, turnings	*13.50-14.50*
Short shovel turnings	*13.50-14.50*
Cast iron borings	*13.50-14.50*
Low phos., 18-in.	*33.00-34.00*

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	*35.00*
Charging box cast	*35.00*
Drop broken machinery	*45.00*

Railroad Scrap

No. 1 R.R., heavy melt.	*29.00-30.00*
Malleable	*33.00-34.00*
Rails, 18-in. and under	*44.00-45.00*
Rails, random lengths	*37.00-38.00*

CHICAGO

No. 1 heavy melting	*30.00-31.00*
No. 2 heavy melting	27.00-28.00
No. 1 factory bundles	*31.00-32.00*
No. 1 dealer bundles	*29.00-30.00*
No. 2 bundles	22.00-23.00
No. 1 busheling	*30.00-31.00*
Machine shop turnings	13.00-14.00
Mixed borings, turnings	13.00-14.00
Short shovel turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut structurals, 3-ft	32.00-33.00
Punchings & plate scrap	32.00-33.00
Electric furnace bundles	31.00-32.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Stove plate	34.00-36.00
Unstripped motor blocks	24.00-25.00
Clean auto cast	40.00-42.00
Drop broken machinery	41.00-42.00

Railroad Scrap

No. 1 R.R., heavy melt.	*31.50-32.50*
R.R. malleable	40.00-42.00
Rails, 2-ft. and under	44.00-45.00
Rails, 18-in. and under	45.00-46.00
Angles, splice bars	36.00-38.00
Rails, rerolling	*40.00-42.00*

Stainless Steel Scrap

18-8 clips & solids	130.00-140.00
18-8 turnings	60.00
430 clips & solids	40.00-42.00
430 turnings	20.00-22.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*20.00*
No. 2 heavy melting	*18.00*
No. 1 bundles	*21.50*
No. 2 bundles	*18.50*
No. 1 busheling	*21.50*
Machine shop turnings	*9.00*
Mixed borings, turnings	*9.00*
Short shovel turnings	*10.00*
Punchings & plate scrap	*24.00*

Cast Iron Grades

No. 1 cupola	36.00
Charging box cast	27.00
Stove plate	29.00
Heavy breakable	26.00
Unstripped motor blocks	18.00
Clean auto cast	40.00
Malleable	28.00

BUFFALO

No. 1 heavy melting	25.00-26.00
No. 2 heavy melting	19.50-20.50
No. 1 bundles	25.00-26.00
No. 2 bundles	17.50-18.50
No. 1 busheling	20.50-21.50
Machine shop turnings	14.00-15.00
Mixed borings, turnings	16.50-17.00
Short shovel turnings	17.50-18.00
Cast iron borings	16.50-17.00
Low phos.	27.50-28.50

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	*37.00-38.00*
No. 1 machinery	*40.00-41.00*

Railroad Scrap

Rails, random lengths	33.00-34.00
Rails, 3-ft and under	40.00-41.00
Railroad specialties	34.50-35.50

BIRMINGHAM

No. 1 heavy melting	19.00-20.00
No. 2 heavy melting	17.00-18.00
No. 1 bundles	19.00-20.00
No. 2 bundles	15.00-16.00
No. 1 busheling	19.00-20.00
Cast iron borings	13.00-14.00
Short shovel turnings	14.00-15.00
Machine shop turnings	12.00-13.00
Electric furnace bundles	25.00-26.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	39.00-40.00
Charging box cast	28.00-29.00
Stove plate	36.00-37.00
Bar crops and plate	28.00-29.00
Structural, plate 2 ft.	28.00-29.00
Heavy breakable cast	28.00-29.00
Unstripped motor blocks	32.00-33.00
No. 1 wheels	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	*26.00-27.00*
Rails, 18-in. and under	39.00-40.00
Rails, random lengths	*34.00-35.00*
Rails, rerolling	*34.00-35.00*
Angles, splice bars	*36.00-37.00*
Stand. steel axles	35.00-36.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	25.50
No. 2 heavy melting	24.50
No. 1 bundles	25.50
No. 2 bundles	19.00-20.00
Machine shop turnings	12.00
Shot shovel turnings	14.00

Cast Iron Grades

No. 1 cupola	37.00
Charging box cast	27.00
Heavy breakable cast	27.00
Unstripped motor blocks	27.00
Brake shoes	30.00
Clean auto cast	39.00
Stove plate	30.00

Railroad Scrap

No. 1 R.R. heavy melt.	29.00
Rails, 18-in. and under	40.00
Rails, random lengths	36.00
Rails, rerolling	*40.00*
Uncut tires	30.00
Angles, splice bars	33.00

SEATTLE

(Delivered consumer plant)

No. 1 heavy melting	23.00
No. 2 heavy melting	19.00
No. 1 bundles	*21.00*
No. 2 bundles	16.00
No. 3 bundles	13.00
Machine shop turnings	11.50
Mixed borings, turnings	11.50
Short shovel turnings	11.50
Electric furnace, No. 1	35.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	30.00-35.00
Heavy breakable cast	25.00
Unstripped motor blocks	23.00
No. 1 wheels	21.00
Stove plate (f.o.b. plant)	28.00
Brake shoes	28.00

Railroad Scrap

(Delivered consumer plant)

Rails, random lengths	30.00-34.00

SAN FRANCISCO

No. 1 heavy melting	20.00
No. 2 heavy melting	16.00
No. 1 bundles	19.00
No. 2 bundles	16.00
No. 1 busheling	20.00
Machine shop turnings	5.00
Mixed borings, turnings	5.00
Short shovel turnings	9.00
Cast iron borings	9.00
Cut structurals	25.00
Heavy turnings	9.00
Punchings & plate scrap	25.00
Electric furnace bundles	19.00

Cast Iron Grades

No. 1 cupola	39.00
Charging box cast	35.00
Stove plate	37.00
Heavy breakable cast	36.00
Unstripped motor blocks	29.00
Brake shoes	35.00
Clean auto cast	39.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	43.00

LOS ANGELES

No. 1 heavy melting	20.00
No. 2 heavy melting	16.00
No. 1 bundles	18.00
No. 2 bundles	14.00
Machine shop turnings	5.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	40.00

HAMILTON, ONT.

(Delivered prices)

No. 1 heavy melting	$22.00
No. 2 heavy melting	19.00
No. 1 bundles	22.00
No. 2 bundles	17.00
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Rails, remelting	32.00
Busheling, new factory: Prepared	20.00
Unprepared	16.00
Short steel turnings	12.00

Cast Iron Grades†

No. 1 machinery cast	42.00-45.00

†F.o.b., shipping point.

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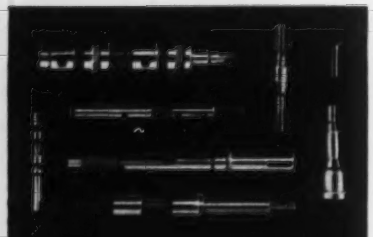

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foundries is active, sustaining the strong price tone in cast grades.

Detroit—Scrap took one of those peculiar price bounces here last week that can only be explained by psychology. Although inventories are still comfortable at all but one major producer in the area, consumers came back into the market with relatively normal volume purchases. Partly responsible is the amount of scrap flowing to Chicago, believes one observer, which has tended to bolster the market here recently.

St. Louis—Scarcity in railroad rails grows, while the market in other scrap items continues sluggish. Rerolling mills are taking all rail offerings, which are declining as carriers trim maintenance work. Posted brokers' buying price, on track, for rerollers is $40, up $1 last week, but none are changing hands at that level. Open hearths are taking most of the roads' other scrap grades, but are under no pressure because of low operating rate. The result is industrial melting scrap is moving slowly at nominal prices. Mill ground stocks are equivalent to 60 to 90 days; those of foundries, somewhat lower.

Seattle—Scrap, both steel and cast iron, is weak and sluggish in this area. Buyers are not active and sales volume is below normal. Consumers have comfortable inventories and are disposed to be choosy in placing new business. Supplies are more than ample. No export interest is reported. Dealers are hoping the price upturn noted in eastern markets will soon be felt in this area.

San Francisco—Steel scrap prices may be rising in the East, but dealers here haven't seen any sign of it. And they don't expect to soon.

Los Angeles—Reacting to sluggish demand, collections of steelmaking scrap have fallen 50 per cent. Auto wreckers, the biggest source of scrap in this district, complain that prices are too low for profitable operation.

Ferroalloys . . .

Ferroalloy Prices, Page 203

Oakland, Calif.—Ferromanganese and silicomanganese have been added to Kaiser Steel Corp.'s line of products. C. F. Borden, vice president in charge of sales at Kaiser's headquarters here, says the Pioche Manganese Co., Salt Lake City, Utah, is producing these alloys for Kaiser Steel. Production from a plant in Henderson, Nev., is from two electric furnaces with a monthly rated capacity of 2500 tons.

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SECOND... *to learn the seven danger signals that may mean cancer, and go straight to the doctor at the first sign of any one of them—(1) Any sore that does not heal (2) A lump or thickening, in the breast or elsewhere (3) Unusual bleeding or discharge (4) Any change in a wart or mole (5) Persistent indigestion or difficulty in swallowing (6) Persistent hoarseness or cough (7) Any change in normal bowel habits.*

For other life saving facts about cancer, phone the American Cancer Society office nearest you, or address your letter to "Cancer"—in care of your local Post Office.

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GOOD EQUIPMENT BRINGS DOWN PRODUCTION COSTS

buttweld pipe mills

The expansion of the steel industry has been marked by great demand for Continuous Butt Weld Pipe Mills from Aetna-Standard. Recent installations include two mills in the new Fontana Works for ½" to 4" and one mill for Skelp Tube for ½" to ¾" sizes.

Most of the Continuous Butt Weld Pipe Mills around the world carry the name of Aetna-Standard. Aetna designs, engineers and builds the mills complete from coil storage [illegible] and warehousing Department [illegible] and inspection Department.

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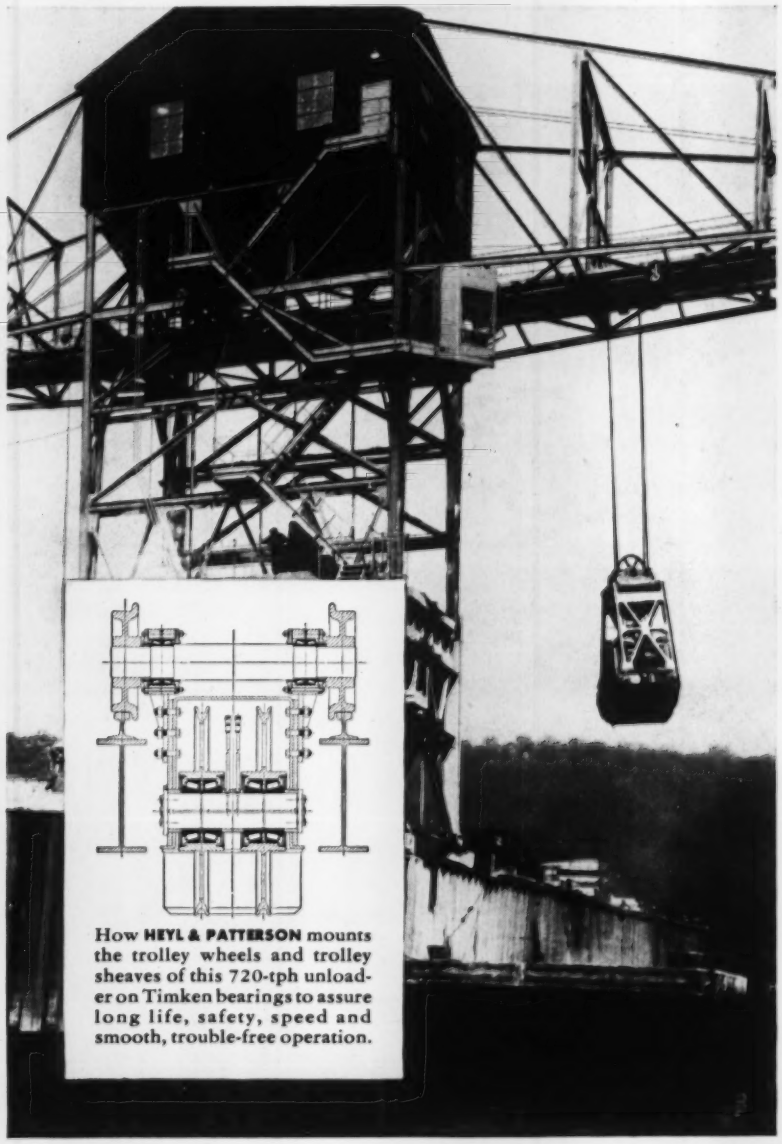


How **HEYL & PATTERSON** mounts the trolley wheels and trolley sheaves of this 720-tph unloader on Timken bearings to assure long life, safety, speed and smooth, trouble-free operation.

IMAGINE the strain on this barge unloader's trolley wheels and sheaves as they make 120 trips per hour, carrying 20 tons of bucket and load per trip! They not only have to take the radial load of the bucket's weight, but also must handle the rugged thrust loads caused by the bucket's swing.

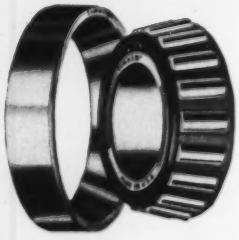
But these tough loads are no problem for this Heyl & Patterson unloader because its trolley wheels and sheaves are mounted on Timken® tapered roller bearings. The tapered construction of Timken bearings enables them to take any combination of radial and thrust loads. And Timken bearings provide extra load carrying capacity because of line contact between their rollers and races.

In addition, Timken bearings help make a 30-second unloading cycle possible because their true rolling motion and incredibly smooth surface finish practically eliminate friction. Sheaves and wheels turn easily, smoothly.

Another benefit: Timken bearings absorb the punishing jolts delivered to the sheaves and trolley wheels because their rollers and races have tough, shock-resistant cores under hard, wear-resistant surfaces.

To get all these advantages, always specify Timken bearings in the equipment you build or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS

WE MAKE OUR OWN STEEL

The special grade alloy steel which gives Timken bearings their strength and resistance to wear is made in our own steel mills.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂ THE TIMKEN TAPERED ROLLER ⊃ BEARING TAKES RADIAL ◎ AND THRUST ⊣◎⊢ LOADS OR ANY COMBINATION